John

# THE [illegible]

# Mariners Com[illegible]

## RECTIFIED.

Containing TABLES [illegible] the [illegible] Hour of the Day, the Sun [illegible] any Point of the Compass: With the tru[illegible] of [illegible] *sing* and *Setting* of the *Sun* [illegible], [illegible] Points of the *Compass* that the [illegible] and [illegible] rise and set with: And Tables of *Amplitude*. All which Tables are Calculated from the *Equinoctial* to 60 deg. of Latitude.

Hereunto is added an

# APPENDIX,

Containing the Description and Use of those Instruments most in Use in the Art of *Navigation*.

With a TABLE of the *Latitude* and *Longitude* [illegible] Places: Composed after a [illegible] Order.

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*By* Andrew Wakely, *Math.*

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Carefully Corrected, Altered, and very [illegible] larged, with many useful Additio[illegible]

By *Ja. Atkinson*, Teacher of the Mathem[illegible]

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*LONDO*[illegible]

Printed by *J.D.* for *Richard* [illegible] *Hill*, where you may have all sorts o[illegible]

# ADVERTISEMENT.

AT *Cherry-Garden-Stairs* on *Rotherhith-Wall*, taught these Mathematical Sciences,

Viz. *Arithmetick*, *Geometry*, *Trigonometry*, *Dialling*, *Navigation*, *Astronomy*, *Merchants Accompts*, *Algebra*, *Surveying*, *Gauging*, *Gunnery*, *Fortification*:

The Use of the *Globes*, and all other Mathematical Instruments; the Projection of the *Sphere* on Circle,

By *JAMES ATKINSO*

There Youth may be Boarded; and those desire it may be taught at their own Dwellings.

There are also made and sold all sorts of Mathematical Instruments, in *Wood*, or *Brass*; for and *Land*; with *Books* to shew the Use of the Where also you may have all sorts of *Maps*, *Sea-Charts* in *Plain* or *Mercator*, on reason Terms.

*

# To the READER.

Courteous Reader,

WHEN I first entred upon these my Labours, and after I had begun the Calculation, I found, that tho the Book be small, yet my Labour was so great, that I almost fainted. Yet at length, when I considered the ordinary, necessary, and frequent use that might be made of these my Labours, I was hereby encouraged to go on and prosecute my Work; and how ready and easy I have made it for actual Performance, will plainly appear by immediate inspection, to the meanest Capacity.

Here follows a brief Explanation of the Method and Order of the Book. First, You will find Tables of the Sun's Declination, newly calculated from the best Hypothesis yet discovered, and applied to the Meridian of London, whose Latitude is 51 d. 32 m. and Longitude according to my Table 0 d. 0 m. Next you will find Tables shewing the true Hour and Minute of the Day, the Sun being upon any Point of the Compass; which Tables are as Dials, fitting all Places in the World, whose Pole is elevated not above 60 d. either North or South. Likewise by these Tables you may know the true Hour and Minute of the Night, by the bearing of any of the known fixed Stars between the Tropicks. Then you will find Tables shewing the true Time of the Sun's Rising and Setting, with the Length of the Day and Night. Also by these Tables you may find the true Time of Rising and Setting of all the eminent fixed Stars between the Tropicks. Next you will find Tables shewing the Points of the Compass that the Sun and the aforesaid Stars rise and set with; which Tables are of excellent use for the ready finding of the Variation of the Compass, and may be performed by a Meridian-Compass that is about ten Inches in Diameter, whose Points being divided into halfs and quarters; such a Compass I suppose to be convenient for the Mariners use, where he hath not an Amplitude-Compass. Next you will find Tables of Amplitudes to every degree of the Sun's Declination. All these Tables are calculated from the Equinoctial to sixty Degrees of Latitude, either North or South, and they will last with Exactness as long as God upholdeth the Order and Course of Nature.

*In the* Appendix *you will find the use of all those Instruments t*
*are most in use in the Art of Navigation, either for Operation or Observati*
*Likewise a Table containing the most and chiefest Harbours, Headla*
*and Islands in the World, shewing the* Latitude *and* Longitude *of t*
*of them, beginning the Longitude at the Meridian of* London, *ne*
*composed in a new successive Order.*

*This Method I own, but how I have acquitted my self there*
*shall leave to the Judgments and Experiments of the skilfullest Mar*
*that the World affords, which are my native Countrymen of* England.

*Courteous Friends,*

Fare ever well, as ever wishes he,
Who is more yours than he can seem to be,

*Rotherith-Wall.*
*13. Sept. 1664.* *Andrew Wakely*

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## *The* Corrector *to the* Reader.

*Candid Reader,*

BEING desired by the Bookseller concerned herein, I willi
ly undertook the Viewing and Correcting of this Treati
(and the rather for that Respect I bear to the Memory of
Brother the deceased Author) which for its Usefulness hath
gained good Esteem with our Navigators: I therefore have to
the greater Pains, spent much Time in examining each Tabl
correcting, mending, altering, explaining, and enlarg
where I saw cause; having endeavoured to render the whole
the *Mariners Compass Rectified* most familiar and easy to an ordina
Capacity.

In this Edition I have contracted the *Tables of Amplitudes*
*Points of the Compass*, and yet as intelligible as before; by whi
having made more room, I have made the Reader amends wi
large Additions in the Uses of each Table, and methodizing t
Discourse throughout: but most especially in the *Appendix*, whe
I have taken the liberty to repair, alter, and enlarge, that

will appear as good as new; but chiefly in the *Description and Use of the Gunter, Sliding-Gunter, and Sector:* principally the two former; whose Uses I have shewed in *Arithmetick*, to *Multiply, Divide*, and work the *Rule of Three*; in *Geometry*, to work *Proportions, Continual, Duplicate*, or *Triplicate*; *Mensuration* of *Superficies*, and *Solids*; as to measure *Board, Timber, Stone, Gauging* of *Vessels*, and *Tunnaging of Ships, Bales* or *Boxes*: Also in *Gunnery*. And in *Navigation*, both in *Plain* and *Mercators Sailing*: In *Astronomy*, in the most useful Problems; as to find the *Sun's* Place, Declination, Rising, Setting, Amplitude, Azimuth, Hour, and Altitude at all times. And in all you are directed plainly to perform them, both by Sliding-Gunter, and with Compasses.

In the *Table of Latitude and Longitude* I have added many Places of note, and omitted some few that were of little moment, and have corrected both the Latitudes and Longitudes of the most eminent, according to the latest Observations; so that I am bold to say, it's the most exact Table of its kind extant.

These with many other *Additions* through the whole, I hope will find acceptance with *Young Students* in the *Mathematicks*, and prove serviceable to them both in their *Studies* and *Practice* of *Navigation*, and other parts of the *Mathematicks*; for whose sakes I took the greater Pains herein, who am an obliged Servant to teach them what may here be wanting.

8th *Sept.* 1693.

*James Atkinson.*

Leap Year.

Sun's Declination, 1692. 1696. 1700. 1704.

| Days | January South. | | February South. | | March South. | | April North. | | May North. | | June North. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 1 | 21 | 48 | 13 | 58 | 03 | 15 | 08 | 44 | 18 | 11 | 23 | 1 |
| 2 | 21 | 38 | 13 | 38 | 02 | 51 | 09 | 06 | 18 | 26 | 23 | 1 |
| 3 | 21 | 28 | 13 | 18 | 02 | 28 | 09 | 27 | 18 | 40 | 23 | 1 |
| 4 | 21 | 18 | 12 | 58 | 02 | 04 | 09 | 49 | 18 | 55 | 23 | 2 |
| 5 | 21 | 07 | 12 | 37 | 01 | 41 | 10 | 10 | 19 | 09 | 23 | 2 |
| 6 | 20 | 57 | 12 | 16 | 01 | 17 | 10 | 31 | 19 | 22 | 23 | 2 |
| 7 | 20 | 44 | 11 | 55 | 00 | 53 | 10 | 52 | 19 | 36 | 23 | 2 |
| 8 | 20 | 32 | 11 | 34 | 00 | 29 | 11 | 13 | 19 | 49 | 23 | 2 |
| 9 | 20 | 19 | 11 | 13 | 00 | 06 | 11 | 34 | 20 | 02 | 23 | 3 |
| 10 | 20 | 06 | 10 | 51 | Nor. | 18 | 11 | 54 | 20 | 14 | 23 | 3 |
| 11 | 19 | 53 | 10 | 30 | 00 | 42 | 12 | 15 | 20 | 26 | 23 | 3 |
| 12 | 19 | 39 | 10 | 08 | 01 | 05 | 12 | 35 | 20 | 38 | 23 | 2 |
| 13 | 19 | 25 | 09 | 46 | 01 | 29 | 12 | 54 | 20 | 49 | 23 | 2 |
| 14 | 19 | 11 | 09 | 24 | 01 | 52 | 13 | 14 | 21 | 00 | 23 | 2 |
| 15 | 18 | 56 | 09 | 01 | 02 | 16 | 13 | 34 | 21 | 11 | 23 | 2 |
| 16 | 18 | 41 | 08 | 39 | 02 | 39 | 13 | 53 | 21 | 21 | 23 | 2 |
| 17 | 18 | 25 | 08 | 16 | 03 | 03 | 14 | 12 | 21 | 31 | 23 | 2 |
| 18 | 18 | 10 | 07 | 54 | 03 | 26 | 14 | 30 | 21 | 40 | 23 | 1 |
| 19 | 17 | 54 | 07 | 31 | 03 | 49 | 14 | 49 | 21 | 49 | 23 | 1 |
| 20 | 17 | 37 | 07 | 08 | 04 | 13 | 15 | 07 | 21 | 58 | 23 | 1 |
| 21 | 17 | 20 | 06 | 45 | 04 | 36 | 15 | 25 | 22 | 07 | 23 | 0 |
| 22 | 17 | 03 | 06 | 22 | 04 | 59 | 15 | 43 | 22 | 14 | 23 | 0 |
| 23 | 16 | 46 | 05 | 59 | 05 | 22 | 16 | 00 | 22 | 22 | 22 | 5 |
| 24 | 16 | 30 | 05 | 36 | 05 | 45 | 16 | 18 | 22 | 29 | 22 | 5 |
| 25 | 16 | 11 | 05 | 13 | 06 | 08 | 16 | 35 | 22 | 36 | 22 | 4 |
| 26 | 15 | 52 | 04 | 49 | 06 | 30 | 16 | 51 | 22 | 43 | 22 | 4 |
| 27 | 15 | 34 | 04 | 26 | 06 | 53 | 17 | 08 | 22 | 49 | 22 | 3 |
| 28 | 15 | 15 | 04 | 02 | 07 | 15 | 17 | 24 | 22 | 54 | 22 | 2 |
| 29 | 14 | 56 | 03 | 39 | 07 | 38 | 17 | 40 | 22 | 59 | 22 | 1 |
| 30 | 14 | 37 | | | 08 | 00 | 17 | 55 | 23 | 04 | 22 | 1 |
| 31 | 14 | 18 | | | 08 | 22 | | | 23 | 09 | | |

*Leap Year.*

Sun's Declination, 1708. 1712. 1716. 1720.

| | *July.* North. | | *August.* North. | | *Septemb.* North. | | *October.* South. | | *Novemb.* South. | | *Decemb.* South. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M | D. | M. | D. | M. |
| 1 | 22 | 02 | 15 | 03 | 04 | 13 | 07 | 26 | 17 | 47 | 23 | 09 |
| 2 | 21 | 54 | 14 | 44 | 03 | 50 | 07 | 48 | 18 | 03 | 23 | 13 |
| 3 | 21 | 45 | 14 | 26 | 03 | 27 | 08 | 11 | 18 | 19 | 23 | 17 |
| 4 | 21 | 36 | 14 | 07 | 03 | 03 | 08 | 33 | 18 | 34 | 23 | 20 |
| 5 | 21 | 26 | 13 | 48 | 02 | 40 | 08 | 55 | 18 | 50 | 23 | 23 |
| 6 | 21 | 16 | 13 | 29 | 02 | 17 | 09 | 17 | 19 | 04 | 23 | 25 |
| 7 | 21 | 06 | 13 | 10 | 01 | 54 | 09 | 39 | 19 | 19 | 23 | 27 |
| 8 | 20 | 25 | 12 | 51 | 01 | 30 | 10 | 01 | 19 | 38 | 23 | 29 |
| 9 | 20 | 44 | 12 | 31 | 01 | 07 | 10 | 23 | 19 | 47 | 23 | 29 |
| 10 | 20 | 33 | 12 | 11 | 00 | 43 | 10 | 45 | 20 | 00 | 23 | 30 |
| 11 | 20 | 21 | 11 | 51 | 00 | 20 | 11 | 06 | 20 | 14 | 23 | 30 |
| 12 | 20 | 09 | 11 | 30 | Sou. | 31 | 11 | 27 | 20 | 26 | 23 | 29 |
| 13 | 19 | 56 | 11 | 10 | 00 | 27 | 11 | 48 | 20 | 39 | 23 | 28 |
| 14 | 19 | 44 | 10 | 40 | 00 | 51 | 12 | 09 | 20 | 51 | 23 | 27 |
| 15 | 19 | 31 | 10 | 28 | 01 | 14 | 12 | 30 | 21 | 02 | 23 | 25 |
| 16 | 19 | 17 | 10 | 07 | 01 | 38 | 12 | 50 | 21 | 13 | 23 | 23 |
| 17 | 19 | 03 | 09 | 46 | 02 | 01 | 13 | 11 | 21 | 24 | 23 | 20 |
| 18 | 18 | 49 | 09 | 25 | 02 | 25 | 13 | 31 | 21 | 34 | 23 | 16 |
| 19 | 18 | 35 | 09 | 03 | 02 | 48 | 13 | 51 | 21 | 44 | 23 | 13 |
| 20 | 18 | 20 | 08 | 42 | 03 | 11 | 14 | 10 | 21 | 54 | 23 | 08 |
| 21 | 18 | 06 | 08 | 20 | 03 | 35 | 14 | 30 | 22 | 03 | 23 | 04 |
| 22 | 17 | 50 | 07 | 58 | 03 | 58 | 14 | 49 | 22 | 12 | 22 | 58 |
| 23 | 17 | 35 | 07 | 36 | 04 | 21 | 15 | 08 | 22 | 20 | 22 | 53 |
| 24 | 17 | 19 | 07 | 14 | 04 | 45 | 15 | 27 | 22 | 28 | 22 | 47 |
| 25 | 17 | 03 | 06 | 52 | 05 | 08 | 15 | 45 | 22 | 35 | 22 | 40 |
| 26 | 16 | 46 | 06 | 29 | 05 | 31 | 16 | 03 | 22 | 42 | 22 | 33 |
| 27 | 16 | 30 | 06 | 07 | 05 | 54 | 16 | 21 | 22 | 49 | 22 | 26 |
| 28 | 16 | 13 | 05 | 44 | 06 | 17 | 16 | 39 | 22 | 55 | 22 | 18 |
| 29 | 15 | 56 | 05 | 22 | 06 | 40 | 16 | 56 | 23 | 00 | 22 | 09 |
| 30 | 15 | 38 | 04 | 59 | 07 | 03 | 17 | 13 | 23 | 05 | 22 | 01 |
| 31 | 15 | 21 | 04 | 36 | | | 17 | 30 | | | 21 | 52 |

*First after Leap Year.*

Sun's Declination, 1693. 1697. 1701. 1705.

| Days. | *January* South. | | *February* South. | | *March* South. | | *April* North. | | *May* North. | | *J* No |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. |
| 1 | 21 | 41 | 13 | 43 | 03 | 22 | 08 | 38 | 18 | 07 | 23 |
| 2 | 21 | 31 | 13 | 23 | 02 | 58 | 09 | 00 | 18 | 22 | 23 |
| 3 | 21 | 21 | 13 | 03 | 02 | 34 | 09 | 22 | 18 | 36 | 23 |
| 4 | 21 | 10 | 12 | 43 | 02 | 11 | 09 | 43 | 18 | 51 | 23 |
| 5 | 20 | 59 | 12 | 22 | 01 | 47 | 10 | 04 | 19 | 05 | 23 |
| 6 | 20 | 47 | 12 | 01 | 01 | 23 | 10 | 26 | 19 | 19 | 23 |
| 7 | 20 | 35 | 11 | 40 | 01 | 00 | 10 | 47 | 19 | 32 | 23 |
| 8 | 20 | 23 | 11 | 18 | 00 | 36 | 11 | 08 | 19 | 45 | 23 |
| 9 | 20 | 10 | 10 | 57 | 00 | 12 | 11 | 28 | 19 | 58 | 23 |
| 10 | 19 | 56 | 10 | 35 | Nor. | 12 | 11 | 49 | 20 | 11 | 23 |
| 11 | 19 | 43 | 10 | 14 | 00 | 35 | 12 | 09 | 20 | 23 | 23 |
| 12 | 19 | 29 | 09 | 52 | 00 | 59 | 12 | 29 | 20 | 34 | 23 |
| 13 | 19 | 15 | 09 | 30 | 01 | 22 | 12 | 49 | 20 | 46 | 23 |
| 14 | 19 | 00 | 09 | 07 | 01 | 46 | 13 | 09 | 20 | 57 | 23 |
| 15 | 18 | 45 | 08 | 45 | 02 | 10 | 13 | 28 | 21 | 08 | 23 |
| 16 | 18 | 30 | 08 | 23 | 02 | 35 | 13 | 47 | 21 | 18 | 23 |
| 17 | 18 | 14 | 08 | 00 | 02 | 56 | 14 | 07 | 21 | 28 | 23 |
| 18 | 17 | 58 | 07 | 37 | 03 | 20 | 14 | 25 | 21 | 38 | 23 |
| 19 | 17 | 42 | 07 | 14 | 03 | 42 | 14 | 44 | 21 | 47 | 23 |
| 20 | 17 | 25 | 06 | 51 | 04 | 06 | 15 | 02 | 21 | 56 | 23 |
| 21 | 17 | 08 | 06 | 28 | 04 | 30 | 15 | 20 | 22 | 04 | 23 |
| 22 | 16 | 51 | 06 | 05 | 04 | 53 | 15 | 38 | 22 | 12 | 23 |
| 23 | 16 | 33 | 05 | 42 | 05 | 16 | 16 | 56 | 22 | 20 | 22 |
| 24 | 16 | 15 | 05 | 19 | 05 | 39 | 16 | 13 | 22 | 27 | 22 |
| 25 | 15 | 57 | 04 | 56 | 06 | 01 | 16 | 30 | 22 | 34 | 22 |
| 26 | 15 | 39 | 04 | 32 | 06 | 24 | 16 | 47 | 22 | 41 | 22 |
| 27 | 15 | 20 | 04 | 09 | 06 | 47 | 17 | 03 | 22 | 47 | 22 |
| 28 | 15 | 01 | 03 | 45 | 07 | 09 | 17 | 20 | 22 | 53 | 22 |
| 29 | 14 | 42 | | | 07 | 32 | 17 | 36 | 22 | 58 | 22 |
| 30 | 14 | 23 | | | 07 | 54 | 17 | 51 | 23 | 03 | 22 |
| 31 | 14 | 03 | | | 08 | 16 | | | 23 | 08 | |

*First after Leap Year.*

Sun's Declination, 1709. 1713. 1717. 1721.

| July. | | August. | | Septemb. | | October. | | Novemb. | | Decemb. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| North. | | North. | | North. | | South. | | South. | | South. | |
| D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 23 | | | | | | | | | | | |
| 23 | 22 | 04 | 15 | 08 | 04 | 19 | 07 | 19 | 17 | 43 | 23 | 08 |
| 23 | 21 | 56 | 14 | 49 | 03 | 56 | 07 | 42 | 17 | 59 | 23 | 12 |
| 23 | 21 | 47 | 14 | 31 | 03 | 33 | 08 | 04 | 18 | 15 | 23 | 16 |
| 23 | 21 | 38 | 14 | 12 | 03 | 10 | 08 | 27 | 18 | 30 | 23 | 19 |
| 23 | 21 | 29 | 13 | 54 | 02 | 47 | 08 | 49 | 18 | 45 | 23 | 22 |
| 23 | 21 | 19 | 13 | 35 | 02 | 23 | 09 | 11 | 19 | 00 | 23 | 25 |
| 23 | 21 | 09 | 13 | 15 | 02 | 00 | 09 | 33 | 19 | 15 | 23 | 27 |
| 23 | 20 | 58 | 12 | 56 | 01 | 37 | 09 | 55 | 19 | 29 | 23 | 28 |
| 23 | 20 | 47 | 12 | 36 | 01 | 13 | 10 | 17 | 19 | 43 | 23 | 29 |
| 23 | 20 | 36 | 12 | 16 | 00 | 50 | 10 | 39 | 19 | 57 | 23 | 30 |
| 23 | 20 | 24 | 11 | 56 | 00 | 26 | 11 | 00 | 20 | 10 | 23 | 30 |
| 23 | 20 | 12 | 11 | 36 | 00 | 03 | 11 | 22 | 20 | 23 | 23 | 30 |
| 23 | 20 | 00 | 11 | 16 | Sou. | 21 | 11 | 43 | 20 | 35 | 23 | 29 |
| 23 | 19 | 47 | 10 | 55 | 00 | 44 | 12 | 04 | 20 | 47 | 23 | 28 |
| 23 | 19 | 34 | 10 | 34 | 01 | 08 | 12 | 24 | 20 | 59 | 23 | 26 |
| 23 | 19 | 21 | 10 | 13 | 01 | 31 | 12 | 45 | 21 | 01 | 23 | 23 |
| 23 | 19 | 07 | 09 | 52 | 01 | 55 | 13 | 05 | 21 | 21 | 23 | 21 |
| 23 | 18 | 53 | 09 | 31 | 02 | 18 | 13 | 25 | 21 | 32 | 23 | 17 |
| 23 | 18 | 39 | 09 | 09 | 02 | 42 | 13 | 45 | 21 | 42 | 23 | 14 |
| 23 | 18 | 24 | 08 | 48 | 03 | 05 | 14 | 05 | 21 | 51 | 23 | 10 |
| 23 | 18 | 10 | 08 | 26 | 03 | 28 | 14 | 25 | 22 | 01 | 23 | 05 |
| 22 | 17 | 55 | 08 | 04 | 03 | 52 | 14 | 44 | 22 | 09 | 23 | 00 |
| 22 | 17 | 39 | 07 | 42 | 04 | 15 | 15 | 03 | 22 | 18 | 22 | 54 |
| 22 | 17 | 23 | 07 | 20 | 04 | 38 | 15 | 22 | 22 | 26 | 22 | 48 |
| 22 | 17 | 07 | 06 | 58 | 05 | 02 | 15 | 40 | 22 | 33 | 22 | 42 |
| 22 | 16 | 51 | 06 | 35 | 05 | 25 | 15 | 59 | 22 | 40 | 22 | 35 |
| 22 | 16 | 34 | 06 | 13 | 05 | 48 | 16 | 17 | 22 | 47 | 22 | 28 |
| 22 | 16 | 18 | 05 | 50 | 06 | 11 | 16 | 34 | 22 | 53 | 22 | 20 |
| 22 | 16 | 00 | 05 | 28 | 06 | 34 | 16 | 52 | 22 | 59 | 22 | 12 |
| 22 | 15 | 43 | 05 | 05 | 06 | 57 | 17 | 09 | 23 | 04 | 22 | 04 |
| | 15 | 26 | 04 | 42 | | | 17 | 26 | | | 21 | 54 |

*Second after Leap Year.*

Sun's Declination, 1694. 1698. 1702. 1706.

| Days | *January* South. | | *February* South. | | *March.* South. | | *April.* North. | | *May.* North. | | *Ju* No |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. |
| 1 | 21 | 44 | 13 | 48 | 03 | 27 | 08 | 33 | 18 | 03 | 23 |
| 2 | 21 | 33 | 13 | 28 | 03 | 04 | 08 | 55 | 18 | 18 | 23 |
| 3 | 21 | 23 | 13 | 08 | 02 | 40 | 09 | 16 | 18 | 33 | 23 |
| 4 | 21 | 13 | 12 | 48 | 02 | 16 | 09 | 38 | 18 | 47 | 23 |
| 5 | 21 | 01 | 12 | 27 | 01 | 53 | 09 | 59 | 19 | 01 | 23 |
| 6 | 20 | 50 | 12 | 06 | 01 | 29 | 10 | 21 | 19 | 15 | 23 |
| 7 | 20 | 38 | 11 | 45 | 01 | 05 | 10 | 42 | 19 | 29 | 23 |
| 8 | 20 | 26 | 11 | 24 | 00 | 42 | 11 | 03 | 19 | 42 | 23 |
| 9 | 20 | 13 | 11 | 02 | 00 | 18 | 11 | 23 | 19 | 55 | 23 |
| 10 | 20 | 00 | 10 | 41 | Nor. | 06 | 11 | 44 | 20 | 08 | 23 |
| 11 | 19 | 46 | 10 | 19 | 00 | 29 | 12 | 05 | 20 | 20 | 23 |
| 12 | 19 | 32 | 09 | 57 | 00 | 53 | 12 | 24 | 20 | 32 | 23 |
| 13 | 19 | 18 | 09 | 35 | 01 | 17 | 12 | 44 | 20 | 43 | 23 |
| 14 | 19 | 04 | 09 | 13 | 01 | 40 | 13 | 04 | 20 | 54 | 23 |
| 15 | 18 | 49 | 08 | 51 | 02 | 04 | 13 | 24 | 21 | 05 | 23 |
| 16 | 18 | 33 | 08 | 28 | 02 | 27 | 13 | 43 | 21 | 16 | 23 |
| 17 | 18 | 18 | 08 | 05 | 02 | 51 | 14 | 02 | 21 | 26 | 23 |
| 18 | 18 | 02 | 07 | 43 | 03 | 14 | 14 | 21 | 21 | 35 | 23 |
| 19 | 17 | 46 | 07 | 20 | 03 | 38 | 14 | 39 | 21 | 45 | 23 |
| 20 | 17 | 29 | 06 | 57 | 04 | 01 | 14 | 58 | 21 | 54 | 23 |
| 21 | 17 | 12 | 06 | 34 | 04 | 24 | 15 | 16 | 22 | 02 | 23 |
| 22 | 16 | 55 | 06 | 11 | 04 | 47 | 15 | 34 | 22 | 10 | 23 |
| 23 | 16 | 38 | 05 | 48 | 05 | 10 | 15 | 52 | 22 | 18 | 23 |
| 24 | 16 | 20 | 05 | 25 | 05 | 33 | 16 | 09 | 22 | 26 | 22 |
| 25 | 16 | 02 | 05 | 01 | 05 | 56 | 16 | 26 | 22 | 33 | 22 |
| 26 | 15 | 43 | 04 | 38 | 06 | 19 | 16 | 43 | 22 | 39 | 22 |
| 27 | 15 | 25 | 04 | 14 | 06 | 41 | 16 | 59 | 22 | 46 | 22 |
| 28 | 15 | 06 | 03 | 51 | 07 | 04 | 17 | 16 | 22 | 52 | 22 |
| 29 | 14 | 47 | | | 07 | 26 | 17 | 32 | 22 | 57 | 22 |
| 30 | 14 | 28 | | | 07 | 49 | 17 | 47 | 23 | 02 | 22 |
| 31 | 14 | 08 | | | 08 | 11 | | | 23 | 07 | |

*Second after Leap Year.*

Sun's Declination, 1710. 1714. 1718. 1722.

| Day | *July.* North. | | *August.* North. | | *Septemb.* North. | | *October.* South. | | *Novemb.* South. | | *Decemb.* South. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 1 | 22 | 06 | 15 | 12 | 04 | 25 | 07 | 14 | 17 | 38 | 23 | 07 |
| 2 | 21 | 58 | 14 | 54 | 04 | 02 | 07 | 36 | 17 | 55 | 23 | 11 |
| 3 | 21 | 49 | 14 | 36 | 03 | 39 | 07 | 59 | 18 | 11 | 23 | 15 |
| 4 | 21 | 40 | 14 | 17 | 03 | 15 | 08 | 22 | 18 | 26 | 23 | 19 |
| 5 | 21 | 31 | 13 | 58 | 02 | 52 | 08 | 44 | 18 | 42 | 23 | 22 |
| 6 | 21 | 21 | 13 | 39 | 02 | 29 | 09 | 06 | 18 | 57 | 23 | 24 |
| 7 | 21 | 11 | 13 | 20 | 02 | 06 | 09 | 28 | 19 | 12 | 23 | 26 |
| 8 | 21 | 01 | 13 | 01 | 01 | 42 | 09 | 50 | 19 | 26 | 23 | 28 |
| 9 | 20 | 50 | 12 | 41 | 01 | 19 | 10 | 12 | 19 | 40 | 23 | 29 |
| 10 | 20 | 39 | 12 | 21 | 00 | 56 | 10 | 34 | 19 | 54 | 23 | 30 |
| 11 | 20 | 27 | 12 | 01 | 00 | 32 | 10 | 55 | 20 | 07 | 23 | 30 |
| 12 | 20 | 15 | 11 | 41 | 00 | 09 | 11 | 16 | 20 | 20 | 23 | 30 |
| 13 | 20 | 03 | 11 | 21 | Son. | 15 | 11 | 38 | 20 | 32 | 23 | 29 |
| 14 | 19 | 50 | 11 | 00 | 00 | 38 | 11 | 59 | 20 | 54 | 23 | 28 |
| 15 | 19 | 37 | 10 | 39 | 01 | 02 | 12 | 19 | 20 | 56 | 23 | 26 |
| 16 | 19 | 24 | 10 | 18 | 01 | 25 | 12 | 40 | 21 | 08 | 23 | 24 |
| 17 | 19 | 11 | 09 | 57 | 01 | 49 | 13 | 00 | 21 | 19 | 23 | 21 |
| 18 | 18 | 57 | 09 | 36 | 02 | 12 | 13 | 21 | 21 | 29 | 23 | 18 |
| 19 | 18 | 43 | 09 | 15 | 02 | 36 | 13 | 41 | 21 | 39 | 23 | 15 |
| 20 | 18 | 28 | 08 | 53 | 02 | 59 | 14 | 00 | 21 | 49 | 23 | 11 |
| 21 | 18 | 13 | 08 | 31 | 03 | 23 | 14 | 20 | 21 | 58 | 23 | 06 |
| 22 | 17 | 58 | 08 | 09 | 03 | 46 | 14 | 39 | 22 | 07 | 23 | 01 |
| 23 | 17 | 43 | 07 | 47 | 04 | 09 | 14 | 58 | 22 | 16 | 22 | 56 |
| 24 | 17 | 27 | 07 | 25 | 04 | 33 | 15 | 17 | 22 | 24 | 22 | 50 |
| 25 | 17 | 11 | 07 | 03 | 04 | 56 | 15 | 36 | 22 | 31 | 22 | 44 |
| 26 | 16 | 54 | 06 | 41 | 05 | 19 | 15 | 54 | 22 | 39 | 22 | 37 |
| 27 | 16 | 38 | 06 | 18 | 05 | 42 | 16 | 12 | 22 | 45 | 22 | 30 |
| 28 | 16 | 22 | 05 | 56 | 06 | 05 | 16 | 30 | 22 | 52 | 22 | 22 |
| 29 | 16 | 05 | 05 | 33 | 06 | 28 | 16 | 48 | 22 | 57 | 22 | 14 |
| 30 | 15 | 47 | 05 | 10 | 06 | 51 | 17 | 05 | 23 | 03 | 22 | 05 |
| 31 | 15 | 30 | 04 | 48 | | | 17 | 22 | | | 21 | 56 |

*Third after Leap Year.*

Sun's Declination, 1695. 1699. 1703. 1707.

| Days | January South. | | February South. | | March. South. | | April. North. | | May. North. | | June North. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | |
| 1 | 21 | 46 | 13 | 58 | 03 | 33 | 08 | 27 | 17 | 59 | 23 | |
| 2 | 21 | 36 | 13 | 33 | 03 | 09 | 08 | 49 | 18 | 14 | 23 | |
| 3 | 21 | 26 | 13 | 13 | 02 | 46 | 09 | 11 | 18 | 29 | 23 | |
| 4 | 21 | 15 | 12 | 53 | 02 | 22 | 09 | 33 | 18 | 44 | 23 | |
| 5 | 21 | 04 | 12 | 32 | 01 | 58 | 09 | 54 | 18 | 58 | 23 | |
| 6 | 20 | 53 | 12 | 10 | 01 | 35 | 10 | 15 | 19 | 12 | 23 | |
| 7 | 20 | 41 | 11 | 50 | 01 | 11 | 10 | 37 | 19 | 26 | 23 | |
| 8 | 20 | 29 | 11 | 29 | 00 | 47 | 10 | 57 | 19 | 39 | 23 | |
| 9 | 20 | 16 | 11 | 08 | 00 | 24 | 11 | 18 | 19 | 52 | 23 | |
| 10 | 20 | 03 | 10 | 46 | 00 | 00 | 11 | 39 | 20 | 05 | 23 | |
| 11 | 19 | 50 | 10 | 24 | Nor. | 24 | 11 | 59 | 20 | 17 | 23 | |
| 12 | 19 | 36 | 10 | 02 | 00 | 47 | 12 | 19 | 20 | 29 | 23 | |
| 13 | 19 | 22 | 09 | 40 | 01 | 11 | 12 | 39 | 20 | 40 | 23 | |
| 14 | 19 | 07 | 09 | 18 | 01 | 35 | 12 | 59 | 20 | 52 | 23 | |
| 15 | 18 | 52 | 08 | 56 | 01 | 58 | 13 | 19 | 21 | 03 | 23 | |
| 16 | 18 | 37 | 08 | 34 | 02 | 22 | 13 | 38 | 21 | 13 | 23 | |
| 17 | 18 | 22 | 08 | 11 | 02 | 45 | 13 | 57 | 21 | 23 | 23 | |
| 18 | 18 | 06 | 07 | 48 | 03 | 09 | 14 | 16 | 21 | 33 | 23 | |
| 19 | 17 | 50 | 07 | 26 | 03 | 32 | 14 | 35 | 21 | 42 | 23 | |
| 20 | 17 | 33 | 07 | 03 | 03 | 55 | 14 | 53 | 21 | 51 | 23 | |
| 21 | 17 | 16 | 06 | 40 | 04 | 18 | 15 | 12 | 22 | 00 | 23 | |
| 22 | 16 | 59 | 06 | 17 | 04 | 42 | 15 | 30 | 22 | 08 | 23 | |
| 23 | 16 | 42 | 05 | 53 | 05 | 05 | 15 | 47 | 22 | 16 | 23 | |
| 24 | 16 | 24 | 05 | 30 | 05 | 28 | 16 | 05 | 22 | 24 | 22 | |
| 25 | 16 | 06 | 05 | 07 | 05 | 50 | 16 | 22 | 22 | 31 | 22 | |
| 26 | 15 | 48 | 04 | 42 | 06 | 13 | 16 | 39 | 22 | 38 | 22 | |
| 27 | 15 | 29 | 04 | 20 | 06 | 36 | 16 | 55 | 22 | 44 | 22 | |
| 28 | 15 | 10 | 03 | 57 | 06 | 58 | 17 | 12 | 22 | 50 | 22 | |
| 29 | 14 | 50 | [illegible] | | 07 | 21 | 17 | 28 | 22 | 56 | 22 | |
| 30 | 14 | 30 | [illegible] | | 07 | 43 | 17 | 44 | 23 | 01 | 22 | |
| 31 | 14 | 10 | [illegible] | | 08 | 05 | | | 23 | 06 | | |

*Third after Leap Year.*

Sun's Declination, 1711. 1715. 1719. 1723.

| *July.* | | *August.* | | *Septemb.* | | *October.* | | *Novemb.* | | *Decemb.* | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| North. | | North. | | North. | | South. | | South. | | South. | |
| D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 22 | 08 | 15 | 16 | 04 | 30 | 07 | 08 | 17 | 34 | 23 | 09 |
| 22 | 00 | 14 | 58 | 04 | 07 | 07 | 31 | 17 | 51 | 23 | 18 |
| 21 | 52 | 14 | 40 | 03 | 44 | 07 | 54 | 18 | 07 | 23 | 14 |
| 21 | 43 | 14 | 22 | 03 | 21 | 08 | 16 | 18 | 23 | 23 | 18 |
| 21 | 33 | 14 | 05 | 02 | 58 | 08 | 38 | 18 | 38 | 23 | 21 |
| 21 | 24 | 13 | 44 | 02 | 35 | 09 | 01 | 18 | 53 | 23 | 24 |
| 21 | 14 | 13 | 23 | 02 | 11 | 09 | 23 | 19 | 08 | 23 | 26 |
| 21 | 03 | 13 | 05 | 01 | 48 | 09 | 145 | 19 | 22 | 23 | 28 |
| 20 | 52 | 12 | 46 | 01 | 25 | 10 | 07 | 19 | 37 | 23 | 29 |
| 20 | 41 | 12 | 26 | 01 | 01 | 10 | 28 | 19 | 50 | 23 | 30 |
| 20 | 30 | 12 | 06 | 00 | 38 | 10 | 50 | 20 | 04 | 23 | 30 |
| 20 | 18 | 11 | 46 | 00 | 14 | 11 | 11 | 20 | 17 | 23 | 30 |
| 20 | 06 | 11 | 26 | Sou. | 09 | 11 | 32 | 20 | 29 | 23 | 29 |
| 19 | 53 | 11 | 05 | 00 | 33 | 11 | 53 | 20 | 41 | 23 | 28 |
| 19 | 41 | 10 | 44 | 00 | 56 | 12 | 14 | 20 | 53 | 23 | 27 |
| 19 | 27 | 10 | 23 | 01 | 20 | 12 | 35 | 21 | 05 | 23 | 25 |
| 19 | 14 | 10 | 02 | 01 | 43 | 12 | 55 | 21 | 16 | 23 | 22 |
| 19 | 00 | 09 | 41 | 02 | 07 | 13 | 16 | 21 | 27 | 23 | 19 |
| 18 | 46 | 09 | 20 | 02 | 30 | 13 | 36 | 21 | 37 | 23 | 16 |
| 18 | 32 | 08 | 58 | 02 | 54 | 13 | 56 | 21 | 47 | 23 | 12 |
| 18 | 17 | 08 | 37 | 03 | 17 | 14 | 15 | 21 | 56 | 23 | 07 |
| 18 | 02 | 08 | 15 | 03 | 40 | 14 | 34 | 22 | 05 | 23 | 02 |
| 17 | 47 | 07 | 53 | 04 | 04 | 14 | 54 | 22 | 14 | 22 | 57 |
| 17 | 31 | 07 | 31 | 04 | 27 | 15 | 13 | 22 | 22 | 22 | 51 |
| 17 | 15 | 07 | 09 | 04 | 50 | 15 | 31 | 22 | 30 | 22 | 45 |
| 16 | 59 | 06 | 46 | 05 | 14 | 15 | [illegible] | [illegible] | [illegible] | 22 | 39 |
| 16 | 42 | 06 | 24 | 05 | 37 | 16 | [illegible] | [illegible] | [illegible] | 22 | 32 |
| 16 | 26 | 06 | 01 | 06 | 00 | 16 | [illegible] | [illegible] | [illegible] | 22 | 24 |
| 16 | 09 | 05 | 39 | 06 | 23 | 16 | [illegible] | [illegible] | [illegible] | 22 | 16 |
| 15 | 52 | 05 | 16 | 06 | 46 | 17 | [illegible] | [illegible] | [illegible] | 22 | 07 |
| 15 | 34 | 04 | 53 | | | 17 | [illegible] | [illegible] | [illegible] | 21 | 57 |

## *The Deſcription and Uſe of the Tables of* Sun's Declination.

BEcauſe in the following parts of this Book, t
*Sun's Declination* is as an Index to the whol
I therefore thought it fit to place theſe foregoi
Tables in the Front of my Labours: Whereof t
firſt Table ſheweth the *Sun's Declination* for eve
day in the Year, for all theſe following Leap Ye
1692. 1696. 1700. 1704. 1708. 1712. 1716. 172
and the ſecond for the firſt Years after the Le
Years, as, namely, 1693. 1697. 1701. 1705. 17
1713. 1717. 1721; and the third for the ſeco
Years after the Leap Years, which are theſe, 16
1698. 1702. 1706. 1710. 1714. 1718. 1722; a
the fourth Table ſheweth the *Sun's Declination*
the third Years after the Leap Years, which
1695. 1699. 1703. 1707. 1711. 1715. 1719. 17
as you may ſee them plainly expreſſed in the h
of each Table. Now for to find the *Sun's Decli*
*tion* for any day in the Year, in any of the Ye
above-ſaid, you muſt look for the Year and Mo
in the head of the Table, and look for the day
the Month in the left hand of the Table, and in
common Angle of meeting you will find the *De*
*nation* that you ſeek after.

*A Table where you may proportion the Sun's* Declination *to any other Meridian.*

| Degrees of Longitude. | *The daily difference in Declination.* | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m. 2 | m 4 | m. 6 | m. 8 | m. 10 | m. 12 | m. 14 | m. 16 | m. 18 | m 20 | m. 22 | m. 24 |
| | m. | m. | m. | m. | m. | m. | m. | m. | m. | m. | m. | m. |
| 15 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| 30 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |
| 45 | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 |
| 60 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 |
| 75 | 0 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 |
| 90 | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 6 |
| 105 | 1 | 1 | 2 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 6 | 7 |
| 120 | 1 | 1 | 2 | 3 | 3 | 4 | 5 | 5 | 6 | 7 | 7 | 8 |
| 135 | 1 | 1 | 2 | 3 | 4 | 4 | 5 | 6 | 7 | 7 | 8 | 9 |
| 150 | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 7 | 7 | 8 | 9 | 10 |
| 165 | 1 | 2 | 3 | 4 | 5 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 180 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

East. } Long. with Decl. { Incr. } Subtr. but Decl. { Decr.

*he uſe that may be made of this Table of Proportion.*

He Tables of the Sun's *Declination* are calculated for the *Meridian of London*, and will ſerve any ce under that Meridian; but for thoſe Places ſi- e Eaſterly or Weſterly from it, the Declination t be proportioned according to its daily *Diffe-* e, and the *Longitude* of thoſe Places from the *Me- n of London*; for which purpoſe this Table is ul, as it's evident by theſe Examples following.

*Exam.* 1. Admit the 10*th* day of *April*, *An.* 1692 am in Longit. 105 d. Eaſt; I demand what Decli tion the Sun will have that day in the Meridian the Place?

The Decli. for *April* 10. in the Meridian of *Lon* is 11 d. 54 m. increaſing, and the daily Difference that time is 21 m. therefore in this Table I look the head thereof for the neareſt number to 21 which is 20 m. then I look on the left hand of Table for 105 d. the Longit. that I am in, and in common Angle of meeting, I find 6, which is to deducted from the Declination in the Meridian *London* aforeſaid, 11 d. 54 m. and the Remain will be the Declination for that Meridian, or Longit. that I am in, which is 11 d. 48 m. N. Bu the Decli. had decreaſed, as it doth here incre then you muſt have added as here under you may

| | d. | m. |
|---|---|---|
| *The* Declination *in the Meridian of* London, | 11 | 54 |
| *The proportional minutes ſubtract*, —— | 00 | 06 |
| *The* Decli. *for the Longit. of* 105 *deg.* E. is — | 11 | 48 |
| *The* Decli. *for the Longit. of* 105 *deg.* W. is | 12 | 00 |

*Example* 2.

Admit the 10*th* day of *October*, *An.* 1694. I am Longitude 87 d. Weſt, I demand the Declinat that the Sun will have that day in that Meridian

| | d. | m. |
|---|---|---|
| *The* Declination *in the Meridian of* London, | 10 | 34 |
| *The proportional minutes, add* —— | 00 | 05 |
| *The* Decli. *in the Longitude of* 87 *d.* W. is — | 10 | 39 |
| *The* Decli. *in the Longitude of* 87 *d.* E. is — | 10 | 29 |

*A Table of the Refractions of* Sun, Moon, *and* Stars, *according to the Obſervation of* Tycho Brahe.

| *Alti-tudes.* | *Sun.* ☉ | *Moon.* ☽ | *Stars.* ★ | *Alti-tudes.* | *Sun.* ☉ | *Moon.* ☽ |
|---|---|---|---|---|---|---|
| 0 | 34 | 33 | 30 | 18 | 06 | 06 |
| 1 | 26 | 25 | 21 | 19 | 05 | 06 |
| 2 | 20 | 20 | 15 | 20 | 04 | 05 |
| 3 | 17 | 17 | 12 | 21 | 04 | 05 |
| 4 | 15 | 15 | 11 | 22 | 03 | 04 |
| 5 | 14 | 14 | 10 | 23 | 03 | 04 |
| 6 | 13 | 13 | 09 | 24 | 03 | 04 |
| 7 | 12 | 13 | 08 | 25 | 02 | 03 |
| 8 | 11 | 12 | 07 | 26 | 02 | 03 |
| 9 | 10 | 11 | 06 | 27 | 02 | 03 |
| 10 | 10 | 11 | 05 | 28 | 02 | 02 |
| 11 | 09 | 10 | 05 | 29 | 02 | 02 |
| 12 | 09 | 09 | 04 | 30 | 01 | 02 |
| 13 | 08 | 09 | 04 | 31 | 01 | 02 |
| 14 | 08 | 08 | 03 | 32 | 01 | 01 |
| 15 | 07 | 08 | 03 | 33 | 01 | 01 |
| 16 | 07 | 07 | 02 | 34 | 01 | 01 |
| 17 | 06 | 07 | 02 | 35 | 01 | 01 |

The Refraction of the *Sun*, *Moon*, and *Stars*, cauſeth them to appear higher above the *Horizon* than they are; therefore the Refraction is always to be ſubtracted from the *Altitude* obſerved, that the true *Altitude* may be had.

As admit the Sun's Meridian Altitude by Obſervation, to be 5 deg. I demand the true Altitude?

| | d. | m. |
|---|---|---|
| *Altitude by Obſervation* | 05 | 00 |
| *Refraction, ſubtract* | 00 | 14 |
| *The true Meridian Altitude* | 04 | 46 |

# *Primum Mobile:*

OR,

# Aſtronomical Tables;

Each TABLE being a SUN DIAL:

Shewing

The exact Hour of the Day, the Su being upon any Point of the Com paſs, fitting all Places upon the Eart and Sea, that lie between the *Equ noctial* and 60 *deg.* of Latitude, eith *North* and *South*: and to laſt wi exactneſs as long as the Great an Everlaſting Creator ſhall be ple ſed to hold together the great an wonderful Fabrick of Nature.

*

## *A Sun-Dial for the Latitude of* 0 *Degree.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d 30m | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| North. | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| N by W | | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 | 0.17 | 0.19 | 0.20 |
| N W | | 0.04 | 0.08 | 0.12 | 0.17 | 0.21 | 0.25 | 0.30 | 0.35 | 0.39 | 0.42 |
| W b N | | 0.07 | 0.13 | 0.20 | 0.27 | 0.34 | 0.41 | 0.49 | 0.56 | 1.03 | 1.00 |
| N W | | 0.10 | 0.20 | 0.30 | 0.41 | 0.51 | 1.02 | 1.14 | 1.25 | 1.36 | 1.47 |
| W b W | | 0.15 | 0.30 | 0.45 | 1.01 | 1.18 | 1.35 | 1.53 | 2.12 | 2.32 | 2.52 |
| N W | | 0.24 | 0.49 | 1.14 | 1.41 | 2.09 | 2.41 | 3.18 | 4.06 | 5.07 | |
| W b N | | 0.51 | 1.44 | 2.46 | 4.10 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| Sets | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 |
| Sun's Semp. | d. m. 0.00 | d. m. 2.30 | d. m. 5.00 | d. m. 7.30 | d. m. 10.0 | d. m. 12.30 | d. m. 15.0 | d. m. 17.30 | d. m. 20.0 | d. m. 22.30 | d. m. 23.30 |

Zen. West.

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d 30m | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| S by W | | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 | 0.17 | 0.19 | 0.20 |
| S W | | 0.04 | 0.08 | 0.12 | 0.17 | 0.21 | 0.25 | 0.30 | 0.35 | 0.39 | 0.42 |
| W b S | | 0.07 | 0.13 | 0.20 | 0.27 | 0.34 | 0.41 | 0.49 | 0.56 | 1.03 | 1.08 |
| S W | | 0.10 | 0.20 | 0.30 | 0.41 | 0.51 | 1.02 | 1.14 | 1.25 | 1.35 | 1.47 |
| W b W | | 0.15 | 0.30 | 0.45 | 1.01 | 1.18 | 1.35 | 1.53 | 2.12 | 2.32 | 2.52 |
| S W | | 0.24 | 0.49 | 1.14 | 1.41 | 2.09 | 2.41 | 3.18 | 4.06 | 5.07 | |
| W b S | | 0.50 | 1.44 | 2.46 | 4.10 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| Sets | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 5.59 |

Zen. West.

## *A Sun-Dial for the Latitude of* 1 *Degree.*

### North Declination.

| Deg. Min. | o d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| Nort. | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 |
| n *by* w | | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0.11 | 0.14 | 0.16 | 0.18 | 0. |
| n n w | | 0.02 | 0.07 | 0.11 | 0.14 | 0.20 | 0.24 | 0.28 | 0.33 | 0.37 | 0. |
| nw *bn* | | 0.04 | 0.11 | 0.17 | 0.24 | 0.31 | 0.38 | 0.46 | 0.53 | 1.00 | 1. |
| n w | | 0.06 | 0.16 | 0.26 | 0.37 | 0.47 | 0.58 | 1.09 | 1.21 | 1.31 | 1. |
| nw *bw* | | 0.09 | 0.24 | 0.40 | 0.56 | 1.12 | 1.29 | 1.51 | 2.06 | 2.23 | 2. |
| w n w | | 0.15 | 0.39 | 1.05 | 1.35 | 2.00 | 2.32 | 3.09 | 3.53 | 5.00 | |
| w *by* n | | 0.30 | 1.24 | 2.25 | 3.48 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ set | 6.00 | 6.00 | 6.00 | 6.00 | 6.01 | 6.01 | 6.01 | 6.01 | 6.01 | 6.02 | 6. |
| Sun's Amp. | d.m. 0.00 | d.m. 2.30 | d.m. 5.00 | d.m. 7.30 | d.m. 10.0 | d.m. 12.30 | d.m. 15.0 | d.m. 17.30 | d.m. 20.0 | d.m. 22.0 | d. 23 |

### South Declination.

| Deg. Min. | o d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 |
| s *by* w | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0.11 | 0.13 | 0.15 | 0.17 | 0.19 | 0. |
| s s w | 0.02 | 0.06 | 0.10 | 0.14 | 0.18 | 0.23 | 0.27 | 0.32 | 0.37 | 0.40 | 0. |
| sw *bys* | 0.03 | 0.09 | 0.16 | 0.23 | 0.30 | 0.37 | 0.44 | 0.51 | 0.59 | 1.05 | 1. |
| s w | 0.04 | 0.14 | 0.24 | 0.34 | 0.45 | 0.55 | 1.06 | 1.17 | 1.29 | 1.39 | 1. |
| sw *by* w | 0.06 | 0.21 | 0.36 | 0.52 | 1.08 | 1.12 | 1.41 | 1.59 | 2.18 | 2.35 | 2. |
| w s w | 0.10 | 0.34 | 0.58 | 1.24 | 1.51 | 2.19 | 2.51 | 3.28 | 4.16 | 5.19 | |
| w *by* s | 0.20 | 1.11 | 2.04 | 3.05 | 4.28 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 6.00 | 6.00 | 6.00 | 5.52 | 5.59 | 5.59 | 5.59 | 5.59 | 5.58 | 5. |

## *A Sun-Dial for the Latitude of 2 Degrees.*

### North Declination.

| ○ d ○ m | Deg. Min. | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| h m | Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| 12 | Nort. | Zen. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 0.02 | n *by* w | | 0.02 | 0.04 | 0.07 | 0.09 | 0.11 | 0.13 | 0.15 | 0.17 | 0.18 |
| 0.03 | n n w | | 0.05 | 0.09 | 0.13 | 0.18 | 0.22 | 0.27 | 0.32 | 0.36 | 0.38 |
| 0.05 | nw *bn* | | 0.08 | 0.15 | 0.22 | 0.29 | 0.36 | 0.43 | 0.51 | 0.57 | 1.01 |
| 0.08 | n w | | 0.12 | 0.22 | 0.33 | 0.43 | 0.54 | 1.05 | 1.17 | 1.27 | 1.35 |
| 0.12 | nw *bw* | | 0.18 | 0.37 | 0.49 | 1.05 | 1.22 | 1.40 | 1.00 | 2.16 | 2.30 |
| 0.16 | w n w | | 0.29 | 0.55 | 1.21 | 1.50 | 2.21 | 2.58 | 3.45 | 4.46 | |
| 0.40 | w *by* n | | 1.03 | 2.03 | 3.23 | | | | | | |
| 6.00 | West. | | | | | | | | | | |
| 6.00 | ⊙ set. | 6.00 | 6.00 | 6.01 | 6.01 | 6.02 | 6.02 | 6.02 | 6.03 | 6.03 | 6.04 |
| d.m. | Sun's | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| 0.00 | Amp. | 2.30 | 5.00 | 7.30 | 10.0 | 12.30 | 15.0 | 17.31 | 20.1 | 22.1 | 23.31 |

### South Declination.

| Deg. Min. | ○ d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 |
| s s w | 0.03 | 0.07 | 0.12 | 0.16 | 0.20 | 0.25 | 0.29 | 0.34 | 0.38 | 0.42 | 0.45 |
| s w *by* s | 0.05 | 0.12 | 0.19 | 0.25 | 0.32 | 0.39 | 0.46 | 0.54 | 1.01 | 1.08 | 1.11 |
| s w | 0.08 | 0.18 | 0.29 | 0.38 | 0.49 | 0.59 | 1.10 | 1.21 | 1.33 | 1.43 | 1.51 |
| sw *by* w | 0.12 | 0.27 | 0.42 | 0.57 | 1.13 | 1.29 | 1.46 | 2.04 | 2.23 | 2.40 | 2.54 |
| w s w | 0.16 | 0.43 | 1.08 | 1.33 | 2.00 | 2.28 | 3.00 | 3.36 | 4.24 | 5.24 | |
| w *by* s | 0.40 | 1.30 | 2.22 | 3.22 | 4.43 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ set. | 6.00 | 6.00 | 6.00 | 5.59 | 5.59 | 5.58 | 5.58 | 5.58 | 5.57 | 5.57 | 5.54 |

## *A Sun-Dial for the Latitude of 3 Degrees.*

### North Declination.

| o d | Deg. | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| o m | Min. | 30m | | 30m | | 30m | | 30m | | | 30 |
| h m | Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| 12 | Nort. | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 0.02 | n *by* w | | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0. |
| 0.05 | n n w | | 0.03 | 0.07 | 0.12 | 0.16 | 0.21 | 0.25 | 0.30 | 0.34 | 0.3 |
| 0.08 | nw *bn* | | 0.05 | 0.12 | 0.19 | 0.26 | 0.33 | 0.40 | 0.48 | 0.54 | 0.5 |
| 0.12 | n w | | 0.08 | 0.19 | 0.29 | 0.35 | 0.50 | 1.01 | 1.13 | 1.23 | 1.3 |
| 0.18 | nw *bw* | | 0.12 | 0.27 | 0.43 | 0.59 | 1.16 | 1.34 | 1.54 | 2.10 | 2.2 |
| 0.29 | w n w | | 0.20 | 0.45 | 1.11 | 1.39 | 2.11 | 2.47 | 3.33 | 4.31 | |
| 0.59 | w *by* n | | 0.42 | 1.40 | 2.57 | | | | | | |
| 6.00 | West. | | | | | | | | | | |
| 6.00 | ⊙ set. | 6.00 | 6.01 | 6.01 | 6.02 | 6.02 | 6.03 | 6.04 | 6.04 | 6.05 | 6.0 |
| d.m. | Sun's | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m |
| 0.00 | Amp. | 2.30 | 5.00 | 7.30 | 10.1 | 10.31 | 15.1 | 17.31 | 20.2 | 22.2 | 23. |

Zen. West.

### South Declination

| Deg. | o d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | 30 |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.13 | 0.15 | 0.17 | 0.19 | 0.21 | 0. |
| s s w | 0.05 | 0.09 | 0.13 | 0.18 | 0.22 | 0.26 | 0.31 | 0.35 | 0.40 | 0.44 | 0. |
| s w *by* s | 0.08 | 0.15 | 0.21 | 0.28 | 0.35 | 0.42 | 0.49 | 0.56 | 1.04 | 1.10 | 1. |
| s w | 0.12 | 0.22 | 0.32 | 0.42 | 0.53 | 1.03 | 1.14 | 1.25 | 1.37 | 1.47 | 1. |
| sw *by* w | 0.18 | 0.33 | 0.48 | 1.03 | 1.19 | 1.35 | 1.52 | 2.10 | 2.30 | 2.46 | 3. |
| w s w | 0.29 | 0.53 | 1.17 | 1.42 | 2.09 | 2.37 | 3.08 | 3.43 | 4.31 | 5.29 | |
| w *by* s | 0.59 | 1.48 | 2.40 | 3.38 | 4.55 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ set | 6.00 | 6.00 | 5.59 | 5.59 | 5.58 | 5.58 | 5.55 | 5.56 | 5.56 | 5.55 | 5. |

## *A Sun Dial for the Latitude of* 4 *Degrees.*

### North Declination.

| eg. | 2 d | | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 23 d |
|---|---|---|---|---|---|---|---|---|---|---|---|
| lin. | 30m | | | 30m | | 30m | | 30m | | | 30m |
| oint | h m | Point | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| outh | 12 | Nort. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| *by* w | 0.01 | n *by* w | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0.11 | 0.13 | 0.15 | 0.17 |
| s w | 0.02 | n n w | 0.02 | 0.06 | 0.10 | 0.14 | 0.19 | 0.23 | 0.28 | 0.32 | 0.35 |
| *w bys* | 0.04 | nw *b* n | 0.03 | 0.09 | 0.16 | 0.23 | 0.30 | 0.38 | 0.45 | 0.52 | 0.57 |
| s w | 0.06 | n w | 0.04 | 0.14 | 0.21 | 0.35 | 0.46 | 0.57 | 1.09 | 1.19 | 1.27 |
| *w bw* | 0.09 | nw *b* w | 0.05 | 0.21 | 0.37 | 0.53 | 1.10 | 1.28 | 1.47 | 2.04 | 2.17 |
| *y* s w | 0.14 | w n w | 0.10 | 0.35 | 1.01 | 1.29 | 2.00 | 2.36 | 3.21 | 4.17 | |
| *by* s | 0.29 | w *by* n | 0.21 | 1.17 | 2.29 | | | | | | |
| Vest. | 3.25 | | | | | | | | | | |
| ☽set. | 6.00 | ☉ set | 6.01 | 6.02 | 6.03 | 6.03 | 6.04 | 6.05 | 6.06 | 6.06 | 6.07 |
| un's | d.m. | Sun s | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| mp. | 2.30 | Amp. | 5.00 | 7.31 | 10.1 | 12.31 | 15.2 | 17.32 | 20.3 | 22.3 | 23.34 |

### South Declination.

| eg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 23 d |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | | 30m | | 30m | | 30m | | 30m | | | 30m |
| oint | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| outh | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| *by* w | 0.03 | 0.05 | 0.07 | 0.09 | 0.11 | 0.13 | 0.16 | 0.18 | 0.20 | 0.22 | 0.23 |
| s w | 0.07 | 0.11 | 0.15 | 0.19 | 0.23 | 0.28 | 0.32 | 0.36 | 0.41 | 0.45 | 0.48 |
| *w bys* | 0.11 | 0.17 | 0.24 | 0.31 | 0.38 | 0.45 | 0.52 | 0.59 | 1.07 | 1.13 | 1.18 |
| w | 0.16 | 0.26 | 0.36 | 0.46 | 0.57 | 1.07 | 1.18 | 1.29 | 1.41 | 1.51 | 1.59 |
| *bw* | 0.24 | 0.39 | 0.54 | 1.09 | 1.25 | 1.41 | 1.58 | 2.16 | 2.35 | 2.52 | 3.05 |
| s w | 0.38 | 1.02 | 1.26 | 1.51 | 2.17 | 2.45 | 3.17 | 3.52 | 4.38 | 5.33 | |
| *by* s | 1.17 | 2.05 | 2.55 | 3.51 | 5.03 | | | | | | |
| Vest. | 6.00 | | | | | | | | | | |
| ☽sets | 6.00 | 6.00 | 5.59 | 5.58 | 5.57 | 5.57 | 5.54 | 5.55 | 5.54 | 5.54 | 5.53 |

## *A Sun-Dial for the Latitude of 5 Degrees.*

### North Declination.

| Deg. Min. | 2 d 30m | | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | Point | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | Nort. | | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.02 | n *by* w | | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 |
| s s w | 0.04 | n n w | | 0.04 | 0.08 | 0.13 | 0.17 | 0.22 | 0.26 | 0.30 |
| sw *bys* | 0.07 | nw *b* n | | 0.07 | 0.14 | 0.21 | 0.28 | 0.35 | 0.43 | 0.49 |
| s w | 0.10 | n w | | 0.10 | 0.20 | 0.31 | 0.42 | 0.53 | 1.05 | 1.15 |
| sw *bw* | 0.19 | nw *b* w | | 0.15 | 0.31 | 0.47 | 1.04 | 1.21 | 1.40 | 1.57 |
| w s w | 0.24 | w n w | | 0.25 | 0.51 | 1.18 | 1.49 | 2.24 | 3.08 | 4.00 |
| w *by* s | 0.48 | w *by* n | | 0.54 | 2.01 | | | | | |
| West. | 4.00 | | | | | | | | | |
| ☉ set | 6.01 | ☉ set | 6.02 | 6.03 | 6.04 | 6.04 | 6.05 | 6.06 | 6.07 | 6.08 |
| Sun's Amp. | d.m. 2.30 | Sun s Amp. | d.m. 5.01 | d.m. 7.31 | d.m. 10.2 | d.m. 12.32 | d.m. 15.3 | d.m. 17.34 | d.m. 20.5 | d.m. 22.5 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 |
| s s w | 0.08 | 0.12 | 0.17 | 0.21 | 0.25 | 0.29 | 0.34 | 0.38 | 0.43 | 0.47 |
| sw *bys* | 0.13 | 0.20 | 0.27 | 0.33 | 0.40 | 0.47 | 0.54 | 1.02 | 1.09 | 1.16 |
| s w | 0.20 | 0.30 | 0.40 | 0.50 | 1.00 | 1.11 | 1.22 | 1.33 | 1.45 | 1.55 |
| sw *b*w | 0.30 | 0.45 | 1.00 | 1.15 | 1.34 | 1.46 | 2.03 | 2.21 | 2.40 | 2.56 |
| w s w | 0.48 | 1.11 | 1.35 | 2.00 | 2.26 | 2.53 | 3.24 | 3.59 | 4.43 | 5.39 |
| w *by* s | 1.35 | 2.21 | 3.09 | 4.03 | 5.11 | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.59 | 5.58 | 5.57 | 5.56 | 5.56 | 5.55 | 5.54 | 5.53 | 5.52 |

## *A Sun-Dial for the Latitude of 6 Degrees.*

### North Declination.

| Deg. Min. | 2 d 30m | 5 d | | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | Points | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | Nort. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| *by* W | 0.03 | 0.01 | n *by* w | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0.11 | 0.13 | 0.15 |
| S W | 0.06 | 0.02 | n n w | 0.03 | 0.07 | 0.11 | 0.15 | 0.20 | 0.24 | 0.28 | 0.31 |
| *by* S | 0.09 | 0.03 | nw *bn* | 0.04 | 0.11 | 0.18 | 0.25 | 0.32 | 0.40 | 0.46 | 0.51 |
| W | 0.14 | 0.04 | n w | 0.06 | 0.16 | 0.27 | 0.38 | 0.49 | 1.01 | 1.10 | 1.18 |
| *bw* | 0.21 | 0.06 | nw *bw* | 0.09 | 0.25 | 0.41 | 0.57 | 1.15 | 1.34 | 1.50 | 2.04 |
| S W | 0.33 | 0.10 | w n w | 0.15 | 0.40 | 1.08 | 1.38 | 2.12 | 2.55 | 3.44 | |
| *by* S | 1.06 | 0.20 | w *by* n | 0.32 | 1.34 | 3.24 | | | | | |
| West. | 4.22 | 2.15 | | | | | | | | | |
| Sets | 6.01 | 6.02 | ⊙ set | 6.03 | 6.04 | 6.05 | 6.06 | 6.07 | 6.09 | 6.10 | 6.11 |
| Sun's Amp. | d.m. 2.30 | d.m. 5.01 | Sun's Amp. | d.m. 7.32 | d.m. 10.3 | d.m. 12.34 | d.m. 15.5 | d.m. 17.36 | d.m. 20.6 | d.m. 22.7 | d.m. 23.39 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| *by* W | 0.05 | 0.07 | 0.09 | 0.11 | 0.13 | 0.15 | 0.17 | 0.19 | 0.21 | 0.23 | 0.24 |
| S W. | 0.10 | 0.14 | 0.18 | 0.22 | 0.27 | 0.31 | 0.35 | 0.40 | 0.44 | 0.48 | 0.51 |
| *by* S | 0.16 | 0.23 | 0.29 | 0.36 | 0.43 | 0.50 | 0.57 | 1.04 | 1.12 | 1.18 | 1.23 |
| W | 0.24 | 0.34 | 0.44 | 0.50 | 1.04 | 1.15 | 1.25 | 1.37 | 1.48 | 1.58 | 2.06 |
| *by* W | 0.36 | 0.50 | 1.05 | 1.20 | 1.36 | 1.52 | 2.08 | 2.26 | 2.45 | 3.02 | 3.15 |
| S W | 0.57 | 1.20 | 1.44 | 2.08 | 2.34 | 3.01 | 3.31 | 4.06 | 4.48 | 5.37 | |
| *by* S | 1.51 | 2.35 | 3.22 | 4.13 | 5.16 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| Sets | 6.00 | 5.59 | 5.58 | 5.57 | 5.56 | 5.55 | 5.54 | 5.53 | 5.51 | 5.50 | 5.49 |

## *A Sun-Dial for the Latitude of 7 Degrees.*

### North Declination.

| Deg. Min. | 2 d 30m | | 5 d | | 7 d 30m | | 10 d | | 12 d 30m | | 15 d | | 17 d 30m | | 20 d | | 22 d | | 2 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h | m | h | m | Point | h | m | h | m | h | m | h | m | h | m | h | m | h | |
| South | 12 | | 12 | | Nort. | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | |
| s *by* w | 0 | 04 | 0 | 02 | n *by* w | 0 | 00 | 0 | 02 | 0 | 04 | 0 | 07 | 0 | 09 | 0 | 11 | 0 | 13 | 0 |
| s s w | 0 | 07 | 0 | 03 | n n w | 0 | 01 | 0 | 05 | 0 | 09 | 0 | 14 | 0 | 18 | 0 | 23 | 0 | 27 | 0 |
| sw *bys* | 0 | 12 | 0 | 05 | nw *bn* | 0 | 01 | 0 | 08 | 0 | 15 | 0 | 22 | 0 | 29 | 0 | 36 | 0 | 44 | 0 |
| s w | 0 | 18 | 0 | 08 | n w | 0 | 02 | 0 | 12 | 0 | 23 | 0 | 33 | 0 | 45 | 0 | 56 | 1 | 06 | 1 |
| sw *bw* | 0 | 27 | 0 | 12 | nw*bw* | 0 | 03 | 0 | 18 | 0 | 34 | 0 | 51 | 1 | 08 | 1 | 27 | 1 | 43 | 1 |
| w s w | 0 | 43 | 0 | 19 | w n w | 0 | 05 | 0 | 30 | 0 | 57 | 1 | 27 | 2 | 00 | 2 | 42 | 3 | 28 | |
| w *by* s | 1 | 23 | 0 | 39 | w *by* n | 0 | 10 | 1 | 08 | 2 | 36 | | | | | | | | | |
| West. | 4 | 37 | 2 | 58 | | | | | | | | | | | | | | | | |
| ⊙ ſet. | 6 | 01 | 6 | 02 | ⊙ ſet | 6 | 03 | 6 | 05 | 6 | 06 | 6 | 08 | 6 | 09 | 6 | 10 | 6 | 11 | 6 |
| Sun's Amp. | d. 2 | m. 31 | d. 5 | m. 02 | Sun's Amp. | d. 7 | m. 33 | d. 10 | m. 4 | d. 12 | m. 35 | d. 15 | m. 7 | d. 17 | m. 38 | d. 20 | m. 9 | d. 22 | m. 10 | d. 2 |

### South Declination.

| Deg. Min. | 0 d | | 2 d 30m | | 5 d | | 7 d 30m | | 10 d | | 12 d 30m | | 15 d | | 17 d 30m | | 20 d | | 22 d | | 2 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| points | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h |
| South | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | |
| s *by* w | 0 | 06 | 0 | 07 | 0 | 09 | 0 | 11 | 0 | 13 | 0 | 16 | 0 | 18 | 0 | 20 | 0 | 22 | 0 | 24 | 0 |
| s s w | 0 | 12 | 0 | 16 | 0 | 20 | 0 | 24 | 0 | 28 | 0 | 33 | 0 | 37 | 0 | 41 | 0 | 46 | 0 | 50 | 0 |
| sw *bys* | 0 | 19 | 0 | 25 | 0 | 32 | 0 | 39 | 0 | 45 | 0 | 52 | 0 | 59 | 1 | 07 | 1 | 13 | 1 | 21 | 1 |
| s w | 0 | 28 | 0 | 38 | 0 | 48 | 0 | 58 | 1 | 08 | 1 | 18 | 1 | 29 | 1 | 40 | 1 | 52 | 2 | 02 | 2 |
| sw*bw* | 0 | 41 | 0 | 56 | 1 | 11 | 1 | 26 | 1 | 41 | 1 | 57 | 2 | 14 | 2 | 31 | 2 | 50 | 3 | 06 | 3 |
| w s w | 1 | 06 | 1 | 29 | 1 | 52 | 2 | 16 | 2 | 41 | 3 | 08 | 3 | 38 | 4 | 12 | 4 | 53 | 5 | 39 | |
| w *by* s | 2 | 06 | 2 | 49 | 3 | 33 | 4 | 22 | 5 | 20 | | | | | | | | | | | |
| West. | 6 | 00 | | | | | | | | | | | | | | | | | | | |
| ⊙ ſets | 6 | 00 | 5 | 59 | 5 | 58 | 5 | 57 | 5 | 55 | 5 | 54 | 5 | 52 | 5 | 51 | 5 | 50 | 5 | 49 | 5 |

## *A Sun-Dial for the Latitude of 8 Degrees.*

### North Declination.

| g. | 2 d 30m | 5 d | 7 d 30m | | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| n. | h m | h m | h m | Point | h m | h m | h m | h m | h m | h m | h m |
| nes | 12 | 12 | 12 | Nort. | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| th. | 0.04 | 0.02 | 0.00 | n *by* w | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 | 0.13 |
| w | 0.09 | 0.05 | 0.01 | n n w | 0.03 | 0.08 | 0.12 | 0.17 | 0.21 | 0.25 | 0.28 |
| *by* s | 0.15 | 0.08 | 0.01 | nw *bn* | 0.05 | 0.12 | 0.20 | 0.27 | 0.34 | 0.41 | 0.45 |
| w | 0.22 | 0.12 | 0.02 | n w | 0.08 | 0.18 | 0.29 | 0.40 | 0.52 | 1.02 | 1.09 |
| w | 0.33 | 0.18 | 0.03 | nw *bw* | 0.12 | 0.28 | 0.43 | 1.00 | 1.19 | 1.35 | 1.47 |
| w | 0.52 | 0.29 | 0.05 | w n w | 0.20 | 0.46 | 1.16 | 1.48 | 2.28 | 3.11 | 4.07 |
| s | 1.39 | 0.56 | 0.10 | w *by* n | 0.44 | 1.59 | | | | | |
| ft. | 4.48 | 3.36 | 1.22 | | | | | | | | |
| ets | 6.01 | 6.03 | 6.04 | ⊙ set | 6.06 | 6.07 | 6.09 | 6.10 | 6.12 | 6.13 | 6.14 |
| n's | d. m | d. m | d. m | Sun's | d. m. | d. m. | d. m. | d. m. | d. m. | d. m | d. m |
| p. | 2.31 | 5.02 | 7.34 | Amp. | 10.6 | 12.37 | 15.9 | 17.40 | 20.12 | 22.13 | 23.46 |

### South Declination.

| g. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| n. | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| ets | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| th. | 0.06 | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0.18 | 0.21 | 0.23 | 0.25 | 0.26 |
| w | 0.13 | 0.17 | 0.21 | 0.26 | 0.30 | 0.34 | 0.38 | 0.43 | 0.47 | 0.51 | 0.54 |
| *by* s | 0.21 | 0.28 | 0.34 | 0.41 | 0.48 | 0.55 | 1.02 | 1.09 | 1.17 | 1.23 | 1.28 |
| w | 0.32 | 0.41 | 0.51 | 1.01 | 1.11 | 1.22 | 1.33 | 1.44 | 1.55 | 2.05 | 2.13 |
| w | 0.47 | 1.02 | 1.16 | 1.31 | 1.46 | 2.02 | 2.17 | 2.35 | 2.53 | 3.09 | 3.22 |
| w | 1.14 | 1.37 | 2.00 | 2.24 | 2.48 | 3.15 | 3.44 | 4.17 | 4.56 | 5.39 | |
| s | 2.20 | 3.01 | 3.44 | 4.26 | 5.24 | | | | | | |
| ft. | 6.00 | | | | | | | | | | |
| ets | 6.00 | 5.59 | 5.57 | 5.56 | 5.54 | 5.53 | 5.51 | 5.50 | 5.48 | 5.47 | 5.46 |

## *A Sun-Dial for the Latitude of 9 Degrees.*

### North Declination.

| Deg. Min. | 2 d 30m | 5 d | 7 d 30m | | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | Point | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | Nort. | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.05 | 0.03 | 0.01 | n *by* w | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0.11 |
| s s w | 0.11 | 0.07 | 0.03 | n n w | 0.02 | 0.06 | 0.10 | 0.14 | 0.19 | 0.23 |
| s w *by* s | 0.17 | 0.11 | 0.04 | nw *by* n | 0.03 | 0.10 | 0.17 | 0.24 | 0.31 | 0.38 |
| s w | 0.26 | 0.16 | 0.06 | n w | 0.04 | 0.14 | 0.25 | 0.36 | 0.47 | 0.57 |
| sw *by* w | 0.38 | 0.24 | 0.09 | nw *by* w | 0.06 | 0.22 | 0.38 | 0.55 | 1.14 | 1.30 |
| w s w | 1.00 | 0.38 | 0.14 | w n w | 0.10 | 0.36 | 1.04 | 1.36 | 2.15 | 2.55 |
| w *by* s | 1.53 | 1.13 | 0.29 | w *by* n | 0.21 | 1.27 | | | | |
| West. | 4.56 | 3.46 | 2.15 | | | | | | | |
| ⊙ sets | 6.01 | 6.03 | 6.04 | ⊙ sets | 6.06 | 6.08 | 6.10 | 6.12 | 6.14 | 6.15 |
| Sun's Amp. | d. m. 2.31 | d. m. 5.03 | d. m. 7.35 | Sun's Amp. | d. m. 10.7 | d. m. 12.39 | d. m. 15.11 | d. m. 17.43 | d. m. 20.16 | d. m. 22.15 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.07 | 0.09 | 0.11 | 0.13 | 0.15 | 0.17 | 0.19 | 0.21 | 0.24 | 0.25 |
| s s w | 0.15 | 0.19 | 0.23 | 0.27 | 0.31 | 0.36 | 0.40 | 0.44 | 0.49 | 0.54 |
| sw *by* s | 0.24 | 0.30 | 0.37 | 0.44 | 0.50 | 0.57 | 1.04 | 1.12 | 1.19 | 1.25 |
| s w | 0.36 | 0.45 | 0.55 | 1.05 | 1.15 | 1.26 | 1.36 | 1.47 | 1.59 | 2.09 |
| sw *by* w | 0.53 | 1.07 | 1.22 | 1.36 | 1.52 | 2.07 | 2.24 | 2.41 | 2.59 | 3.15 |
| w s w | 1.23 | 1.45 | 2.08 | 2.31 | 2.55 | 3.21 | 3.50 | 4.22 | 5.00 | 5.40 |
| w *by* s | 2.33 | 3.12 | 3.53 | 4.36 | 5.27 | | | | | |
| West. | 6.00 | | | | | | | | | |
| ⊙ sets | 6.00 | 5.59 | 5.57 | 5.56 | 5.54 | 5.52 | 5.50 | 5.48 | 4.46 | 5.45 |

## *A Sun-Dial for the Latitude of* 10 *Degrees.*

### North Declination.

| g. | 2 d 30m | 5 d | 7 d 30m | 10 d | | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | h m | h m | h m | h m | Point | h m | h m | h m | h m | h m | h m |
| int | 1 | 12 | 12 | 12 | Nort. | 12 | 12 | 12 | 12 | 12 | 12 |
| y w | 0.06 | 0.04 | 0.02 | | *n by w* | 0.02 | 0.04 | 0.06 | 0.08 | 0.10 | 0.12 |
| s w | 0.12 | 0.08 | 0.04 | | n n w | 0.04 | 0.09 | 0.13 | 0.18 | 0.21 | 0.24 |
| *bys* | 0.20 | 0.13 | 0.07 | | nw *bn* | 0.07 | 0.14 | 0.21 | 0.29 | 0.35 | 0.40 |
| w | 0.30 | 0.17 | 0.10 | | n w | 0.10 | 0.21 | 0.32 | 0.43 | 0.53 | 1.00 |
| *bw* | 0.44 | 0.30 | 0.15 | | nw *bw* | 0.15 | 0.32 | 0.49 | 1.06 | 1.23 | 1.35 |
| s w | 1.09 | 0.47 | 0.24 | | w n w | 0.25 | 0.53 | 1.24 | 2.01 | 2.39 | 3.19 |
| *y* s | 2.07 | 1.28 | 0.47 | | w *by* n | 0.59 | 1.07 | | | | |
| eſt. | 5.03 | 4.01 | 2.47 | | | | | | | | |
| ſet | 6.02 | 6.04 | 6.05 | 6.07 | ⊙ ſet | 6.09 | 6.11 | 6.13 | 6.15 | 6.17 | 6.18 |
| n's | d.m. | d.m. | d.m. | d.m. | Sun's | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| mp. | 2.32 | 5.05 | 7.37 | 10.10 | Amp. | 12.42 | 15.15 | 17.47 | 20.20 | 22.22 | 23.54 |

Zen. Weſt.

### South Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| nts | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| th | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| w | 0.08 | 0.10 | 0.12 | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.27 |
| w | 0.16 | 0.21 | 0.25 | 0.29 | 0.33 | 0.37 | 0.42 | 0.46 | 0.51 | 0.54 | 0.57 |
| *bys* | 0.26 | 0.33 | 0.40 | 0.46 | 0.53 | 1.00 | 1.07 | 1.14 | 1.22 | 1.28 | 1.33 |
| w | 0.39 | 0.49 | 0.56 | 1.09 | 1.19 | 1.29 | 1.40 | 1.51 | 2.02 | 2.12 | 2.19 |
| *y* w | 0.58 | 1.13 | 1.27 | 1.42 | 1.57 | 2.12 | 2.28 | 2.45 | 3.03 | 3.19 | 3.32 |
| w | 1.31 | 1.53 | 2.15 | 2.38 | 3.02 | 3.27 | 3.55 | 4.26 | 5.03 | 5.41 | |
| s | 2.44 | 3.22 | 4.01 | 4.42 | 5.29 | | | | | | |
| ſt. | 6.00 | | | | | | | | | | |
| ts | 6.00 | 5.58 | 5.56 | 5.55 | 5.53 | 5.51 | 5.49 | 5.47 | 5.45 | 5.43 | 5.42 |

## *A Sun-Dial for the Latitude of* 11 *Degrees.*

### North Declination.

| Deg. Min. | 2 d 30m | 5 d | 7 d 30m | 10 d | | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | Point | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | Nort. | 12 | 12 | 12 | 12 | 12 | 1 |
| s *by* w | 0.07 | 0.05 | 0.03 | 0.01 | n *by* w | 0.01 | 0.03 | 0.05 | 0.07 | 0.09 | 0. |
| s s w | 0.14 | 0.10 | 0.06 | 0,02 | n n w | 0.02 | 0.07 | 0.11 | 0.16 | 0.20 | 0. |
| sw *bys* | 0.21 | 0.16 | 0.11 | 0.03 | nw *bn* | 0.04 | 0.11 | 0.18 | 0.26 | 0.44 | 0. |
| s w | 0.34 | 0.24 | 0.14 | 0.04 | n w | 0.06 | 0.17 | 0.28 | 0.39 | 0.32 | 0. |
| sw *bw* | 0.50 | 0.35 | 0.21 | 0.06 | nw *bw* | 0.09 | 0.25 | 0.42 | 1.00 | 1.15 | 1. |
| w s w | 1.17 | 0.56 | 0.33 | 0.08 | w n w | 0.15 | 0.41 | 1.12 | 1.47 | 2,23 | 2. |
| w *by* s | 2.19 | 1.43 | 1.03 | 0.20 | w *by* n | 0.33 | 1.55 | | | | |
| West. | 5.08 | 4.13 | 3.09 | 2.19 | | | | | | | |
| ⊙ set | 6.02 | 6.04 | 6.06 | 6.08 | ⊙ set | 6.10 | 6.12 | 6.14 | 6.16 | 6.18 | 6 |
| Sun's | d.m. | d.m. | d.m. | d.m. | Sun's | d.m. | d.m. | d.m. | d.m. | d.m. | d. |
| Amp. | 2.32 | 5.05 | 7.38 | 10.11 | Amp. | 12.44 | 15.17 | 17.50 | 20.24 | 22.27 | 2 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 |
| s *by* w | 0.09 | 0.11 | 0.13 | 0.15 | 0.17 | 0.19 | 0.21 | 0.23 | 0.25 | 0.27 | 0. |
| s s w | 0.18 | 0.22 | 0.26 | 0.30 | 0.34 | 0.39 | 0.43 | 0.47 | 0.52 | 0.56 | 0. |
| sw *bys* | 0.29 | 0.37 | 0.42 | 0.49 | 0.55 | 1.02 | 1.09 | 1.16 | 1.24 | 1.30 | 1. |
| s w | 0.43 | 0.53 | 1.03 | 1.12 | 1.22 | 1.33 | 1.43 | 1.54 | 2.05 | 2.15 | 2. |
| sw *byw* | 1.04 | 1.18 | 1.32 | 1.47 | 2.01 | 2.17 | 2.33 | 2.49 | 3.07 | 3.23 | 3. |
| w s w | 1.39 | 2.01 | 2.22 | 2.45 | 3.10 | 3.33 | 4.00 | 4.30 | 5.05 | 5.41 | |
| w *by* s | 2.55 | 3.31 | 4.08 | 4.47 | 5.31 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.58 | 5.56 | 5.51 | 5.52 | 5.50 | 5.48 | 5.46 | 5.44 | 5.42 | 5 |

## A Sun-Dial for the Latitude of 52 Degrees.

### North Declination.

| Deg. | 2 d | 5 d | 7 d 30m | 10 d | | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 30m | | | | | | | | | | |
| Points | h m | h m | h m | h m | Points | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | Nor. | 12 | 12 | 12 | 12 | 12 | 12 |
| by w | 0.07 | 0.06 | 0.04 | 0.02 | n by w | 0.00 | 0.02 | 0.04 | 0.07 | 0.09 | 0.10 |
| s w | 0.16 | 0.12 | 0.08 | 0.04 | n n w | 0.01 | 0.05 | 0.10 | 0.14 | 0.18 | 0.21 |
| w by s | 0.25 | 0.19 | 0.12 | 0.05 | nw by n | 0.01 | 0.08 | 0.15 | 0.23 | 0.29 | 0.34 |
| s.w | 0.37 | 0.28 | 0.18 | 0.08 | n w | 0.02 | 0.12 | 0.23 | 0.35 | 0.44 | 0.51 |
| w by w | 0.55 | 0.41 | 0.27 | 0.12 | nw by w | 0.03 | 0.19 | 0.33 | 0.49 | 1.09 | 1.21 |
| w s w | 1.25 | 1.04 | 0.42 | 0.19 | w n w | 0.05 | 0.31 | 1.00 | 1.14 | 2.07 | 2.40 |
| w by s | 2.31 | 1.56 | 1.23 | 0.38 | w by n | 0.09 | 1.17 | | | | |
| West. | 5.13 | 4.23 | 3.27 | 2.16 | | | | | | | |
| ☉ sets | 6.02 | 6.04 | 6.06 | 6.09 | ☉ sets | 6.11 | 6.13 | 6.15 | 6.18 | 6.20 | 6.22 |
| Sun's | d. m. | d. m. | d. m. | d. m. | Sun's | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. |
| Amp. | 2.33 | 5.07 | 7.39 | 10.13 | Amp. | 12.46 | 15.20 | 17.55 | 20.28 | 22.31 | 24.5 |

### South Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by w | 0.09 | 0.11 | 0.13 | 0.15 | 0.17 | 0.19 | 0.21 | 0.23 | 0.25 | 0.27 | 0.29 |
| s w | 0.20 | 0.24 | 0.28 | 0.32 | 0.36 | 0.40 | 0.44 | 0.49 | 0.53 | 0.57 | 1.00 |
| w by s | 0.32 | 0.38 | 0.45 | 0.51 | 0.58 | 1.05 | 1.12 | 1.19 | 1.26 | 1.32 | 1.37 |
| s w | 0.47 | 0.56 | 1.06 | 1.16 | 1.26 | 1.36 | 1.46 | 1.57 | 2.08 | 2.18 | 2.55 |
| w by w | 1.09 | 1.23 | 1.37 | 1.52 | 2.06 | 2.21 | 2.37 | 2.51 | 3.11 | 3.27 | 3.39 |
| w s w | 1.47 | 2.07 | 2.29 | 2.51 | 3.14 | 3.38 | 4.04 | 4.33 | 5.07 | 5.41 | |
| w by s | 3.05 | 3.39 | 4.18 | 4.51 | 5.32 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ☉ sets | 6.00 | 5.58 | 5.56 | 5.54 | 5.51 | 5.49 | 5.47 | 5.45 | 5.42 | 5.40 | 5.38 |

## A Sun-Dial for the Latitude of 13 Degrees.

### North Declination.

| Deg. | 2 d | 5 d | 7 d | 10 d | 12 d | | 15 d | 17 d | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 30m | | 30m | | 30m | | | 30m | | | |
| Points | h m | h m | h m | h m | h m | Points | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | Nort. | 12 | 12 | 12 | 12 | |
| s by w | 0.18 | 0.06 | 0.04 | 0.02 | 0.00 | n by w | 0.02 | 0.04 | 0.06 | 0.08 | 0 |
| s s w | 0.17 | 0.13 | 0.09 | 0.05 | 0.01 | n n w | 0.03 | 0.08 | 0.12 | 0.16 | 0 |
| s w by s | 0.28 | 0.21 | 0.15 | 0.08 | 0.01 | n w by n | 0.06 | 0.13 | 0.21 | 0.27 | 0 |
| s w | 0.41 | 0.32 | 0.22 | 0.12 | 0.02 | n w | 0.08 | 0.17 | 0.30 | 0.40 | 0 |
| s w by w | 1.01 | 0.47 | 0.32 | 0.18 | 0.03 | n w by w | 0.13 | 0.29 | 0.46 | 1.01 | 1 |
| w s w | 1.33 | 1.12 | 0.51 | 0.28 | 0.05 | w n w | 0.21 | 0.49 | 1.21 | 1.52 | 2 |
| w by s | 2.41 | 2.08 | 1.29 | 0.54 | 0.10 | w by n | 0.48 | | | | |
| West. | 5.16 | 4.31 | 3.39 | 2.41 | 1.05 | | | | | | |
| ⊙ sets | 6.02 | 6.05 | 6.07 | 6.09 | 6.11 | ⊙ sets | 6.14 | 6.16 | 6.19 | 6.21 | |
| Sun's | d. m. | d. m. | d. m. | d. m. | d. m. | Sun's | d. m. | d. m. | d. m. | d. m. | d. m |
| Amp. | 2.33 | 5.08 | 7.42 | 10.16 | 12.49 | Amp. | 15.24 | 17.59 | 20.33 | 22.37 | |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s by w | 0.10 | 0.12 | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.28 | 0 |
| s s w | 0.21 | 0.25 | 0.29 | 0.33 | 0.38 | 0.42 | 0.46 | 0.50 | 0.55 | 0.59 | 1 |
| s w by s | 0.34 | 0.41 | 0.47 | 0.54 | 1.00 | 1.07 | 1.14 | 1.20 | 1.28 | 1.34 | 1 |
| s w | 0.51 | 1.00 | 1.10 | 1.19 | 1.29 | 1.39 | 1.50 | 2.01 | 2.12 | 2.21 | 2 |
| s w by w | 1.14 | 1.28 | 1.42 | 1.56 | 2.11 | 2.26 | 2.41 | 2.58 | 3.15 | 3.30 | 3 |
| w s w | 1.54 | 2.15 | 2.36 | 2.57 | 3.20 | 3.43 | 4.09 | 4.37 | 5.09 | 5.40 | |
| w by s | 3.14 | 3.47 | 4.20 | 4.55 | 5.34 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.58 | 5.55 | 5.52 | 5.51 | 5.49 | 5.46 | 5.44 | 5.41 | 5.39 | 5 |

## A Sun-Dial for the Latitude of 14 Degrees.

### North Declination.

| Deg. | 2 d | 5 d | 7 d | 10 d | 12 d | | 15 d | 17 d | 20 d | 22 d | 23 d |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 30m | | 30m | | 30m | | | 30m | | | 30m |
| Points | h m | h m | h m | h m | h m | Points | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | North. | 12 | 12 | 12 | 12 | 12 |
| S W | 0.09 | 0.07 | 0.05 | 0.03 | 0.01 | N by W | 0.01 | 0.03 | 0.05 | 0.07 | 0.08 |
| S W | 0.19 | 0.15 | 0.11 | 0.07 | 0.03 | N N W | 0.02 | 0.06 | 0.10 | 0.14 | 0.17 |
| W by S | 0.30 | 0.24 | 0.17 | 0.11 | 0.04 | N W by N | 0.03 | 0.10 | 0.17 | 0.22 | 0.28 |
| W | 0.45 | 0.35 | 0.26 | 0.16 | 0.06 | N W | 0.04 | 0.15 | 0.26 | 0.35 | 0.43 |
| W by W | 1.06 | 0.52 | 0.38 | 0.24 | 0.09 | N W by W | 0.06 | 0.22 | 0.40 | 0.54 | 1.06 |
| N W | 1.41 | 1.20 | 0.59 | 0.38 | 0.15 | W N W | 0.10 | 0.37 | 1.08 | 1.38 | 2.05 |
| W by N | 2.52 | 2.19 | 1.46 | 1.10 | 0.29 | W by N | 0.22 | 1.48 | | | |
| West. | 4.20 | 5.38 | 3.52 | 3.00 | 1.49 | | | | | | |
| Sets | 6.02 | 6.05 | 6.07 | 5.10 | 6.12 | ☉ Sets | 6.15 | 6.18 | 6.21 | 6.23 | 6.25 |
| Sun's Amp. | d. m. | d. m. | d. m. | d. m. | d. m. | Sun's Amp. | d. m. | d. m. | d. m. | d. m. | d. m. |
| | 2.34 | 5.09 | 7.44 | 10.19 | 12.53 | | 5.28 | 18.3 | 20.38 | 22.42 | 24.17 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 23 d |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | 30m |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| S by W | 0.11 | 0.13 | 0.15 | 0.17 | 0.19 | 0.21 | 0.23 | 0.25 | 0.27 | 0.29 | 0.30 |
| S S W | 0.23 | 0.27 | 0.31 | 0.35 | 0.40 | 0.44 | 0.48 | 0.53 | 0.57 | 1.01 | 1.04 |
| S W by S | 0.37 | 0.43 | 0.50 | 0.56 | 1.03 | 1.10 | 1.16 | 1.23 | 1.31 | 1.36 | 1.42 |
| S W | 0.54 | 1.04 | 1.13 | 1.23 | 1.33 | 1.43 | 1.58 | 2.04 | 2.15 | 2.24 | 2.31 |
| W by W | 1.20 | 1.33 | 1.47 | 2.01 | 2.15 | 2.30 | 2.45 | 3.02 | 3.19 | 3.33 | 3.45 |
| W S W | 2.01 | 2.21 | 2.42 | 3.03 | 3.25 | 3.48 | 4.12 | 4.40 | 5.11 | 5.40 | |
| W by S | 3.22 | 3.53 | 4.29 | 4.59 | 5.35 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ☉ Sets | 6.00 | 5.58 | 5.55 | 5.52 | 5.50 | 5.48 | 5.45 | 5.42 | 5.39 | 5.37 | 5.35 |

## A Sun-Dial for the Latitude of 15 Degrees.

### North Declination.

| Deg. | 2 d | 5 d | 7 d | 10 d | 12 d | | 15 d | 17 d | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 30m | | 30m | | 30m | | | 30m | | | |
| Points | h m | h m | h m | h m | h m | Points | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | Nort. | 12 | 12 | 12 | 12 | |
| s by w | 0.10 | 0.08 | 0.06 | 0.04 | 0.02 | n by w | | 0.02 | 0.04 | 0.06 | 0 |
| ssw | 0.21 | 0.16 | 0.12 | 0.08 | 0.04 | n n w | | 0.04 | 0.09 | 0.12 | 0 |
| sw by s | 0.33 | 0.26 | 0.20 | 0.13 | 0.07 | nw bn | | 0.07 | 0.14 | 0.20 | 0 |
| s w | 0.40 | 0.39 | 0.30 | 0.20 | 0.10 | n w | | 0.11 | 0.22 | 0.31 | 0 |
| sw bw | 1.11 | 0.58 | 0.44 | 0.30 | 0.15 | nwbw | | 0.16 | 0.33 | 0.47 | 0 |
| w s w | 1.40 | 1.28 | 1.08 | 0.47 | 0.24 | w n w | | 0.26 | 0.56 | 1.24 | 1 |
| w by s | 3.00 | 2.30 | 1.58 | 1.24 | 0.46 | w by n | | 1.06 | | | |
| West. | 5.22 | 4.44 | 4.02 | 3.15 | 2.17 | | | | | | |
| ⊙ set | 6.02 | 6.05 | 6.08 | 6.11 | 6.13 | ⊙ set | 6.16 | 6.19 | 6.22 | 6.25 | 6 |
| Sun's Amp. | d.m. 2.35 | d.m. 5.10 | d.m. 7.46 | d.m. 10.21 | d.m. 12.56 | Sun's Amp. | d.m. 5.32 | d.m. 18.8 | d.m. 20.44 | d.m. 22.49 | d. 24 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | 30 |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 |
| s by w | 0.12 | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.28 | 0.30 | 0. |
| ssw | 0.24 | 0.28 | 0.32 | 0.36 | 0.40 | 0.45 | 0.49 | 0.53 | 0.58 | 1.01 | 1. |
| sw by s | 0.39 | 0.46 | 0.52 | 0.59 | 1.05 | 1.12 | 1.18 | 1.25 | 1.33 | 1.39 | 1. |
| s w | 0.58 | 1.07 | 1.17 | 1.26 | 1.36 | 1.46 | 1.56 | 2.07 | 2.18 | 2.27 | 2. |
| swbyw | 1.25 | 1.38 | 1.52 | 2.06 | 2.20 | 2.34 | 2.49 | 3.05 | 3.22 | 3.37 | 3. |
| w s w | 2.08 | 2.28 | 2.48 | 3.08 | 3.29 | 3.52 | 4.16 | 4.42 | 5.12 | 5.40 | |
| w by s | 3.30 | 4.00 | 4.30 | 5.02 | 5.36 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.58 | 5.55 | 5.52 | 5.49 | 5.47 | 5.44 | 5.41 | 5.38 | 5.35 | 5. |

## A Sun-Dial for the Latitude of 16 Degrees.

### North Declination.

| Deg. | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Diff. | h m | h m | h m | h m | h m | h m | Points | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | North. | 12 | 12 | 12 | 12 |
| by w | 0.11 | 0.09 | 0.07 | 0.05 | 0.03 | 0.01 | n by w | 0.01 | 0.03 | 0.05 | 0.07 |
| s w | 0.22 | 0.18 | 0.14 | 0.10 | 0.06 | 0.02 | n n w | 0.03 | 0.07 | 0.11 | 0.14 |
| bys | 0.35 | 0.29 | 0.23 | 0.16 | 0.10 | 0.03 | nw b n | 0.04 | 0.09 | 0.17 | 0.22 |
| w | 0.52 | 0.43 | 0.34 | 0.25 | 0.14 | 0.04 | n w | 0.06 | 0.17 | 0.26 | 0.35 |
| bw | 1.16 | 0.03 | 0.49 | 0.35 | 0.21 | 0.06 | nw b w | 0.10 | 0.26 | 0.40 | 0.52 |
| s w | 1.55 | 1.36 | 1.16 | 0.55 | 0.33 | 0.10 | w n w | 0.16 | 0.44 | 1.11 | 1.34 |
| by s | 3.08 | 2.39 | 2.09 | 1.37 | 1.01 | 0.20 | w by n | 0.36 | | | |
| West. | 5.25 | 4.49 | 4.11 | 3.28 | 2.37 | 1.23 | | | | | |
| Sets | 6.03 | 6.06 | 6.09 | 6.12 | 6.15 | 6.18 | ⊙ sets | 6.21 | 6.24 | 6.27 | 6.29 |
| Sun's | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | Sun's | d.m. | d.m. | d.m. | d.m. |
| Amp. | 2.35 | 6.12 | 7.48 | 0.24 | 13.0 | 15.37 | Amp. | 8.13 | 20.5 | 22.56 | 24.32 |

### South Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by w | 0.13 | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.28 | 0.30 | 0.32 |
| s w | 0.26 | 0.30 | 0.34 | 0.38 | 0.42 | 0.46 | 0.50 | 0.55 | 0.59 | 1.03 | 1.06 |
| w by s | 0.42 | 0.48 | 0.54 | 1.01 | 1.07 | 1.14 | 1.21 | 1.28 | 1.35 | 1.41 | 1.46 |
| w | 1.02 | 1.11 | 1.20 | 1.29 | 1.39 | 1.49 | 1.59 | 2.10 | 2.21 | 2.30 | 2.37 |
| w by w | 1.30 | 1.43 | 1.56 | 2.10 | 2.24 | 2.38 | 2.53 | 3.09 | 3.25 | 3.40 | 3.51 |
| w s w | 2.15 | 2.34 | 2.54 | 3.14 | 3.34 | 3.56 | 4.19 | 4.45 | 5.13 | 5.40 | |
| w by s | 3.37 | 4.05 | 4.34 | 5.04 | 5.36 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.57 | 5.54 | 5.51 | 5.48 | 5.45 | 5.42 | 5.39 | 5.36 | 5.33 | 5.31 |

## A Sun Dial for the Latitude of 17 Degrees.

### North Declination.

| Deg. | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | | 17 d | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 30m | | 30m | | 30m | | | 30m | | |
| Point | h m | h m | h m | h m | h m | h m | Point | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | Nort, | 12 | 12 | 12 |
| s *by* w | 0.11 | 0.09 | 0.07 | 0.06 | 0.04 | 0.02 | n *by* w | 0,00 | 0.02 | 0.04 |
| s s w | 0.24 | 0.20 | 0.16 | 0,12 | 0,08 | 0.03 | n n w | 0.01 | 0.05 | 0.09 |
| sw *by* s | 0.38 | 0.32 | 0.25 | 0.19 | 0.13 | 0.06 | nw *by* n | 0.01 | 0.08 | 0.15 |
| s w | 0.56 | 0.47 | 0.38 | 0.28 | 0.19 | 0.08 | n w | 0.02 | 0.13 | 0.22 |
| sw *by* w | 1.21 | 1.08 | 0.55 | 0.41 | 0.27 | 0.12 | nw *by* w | 0.03 | 0.19 | 0.33 |
| w s w | 2.02 | 1.42 | 1.23 | 1.03 | 0.42 | 0.19 | w n w | 0.05 | 0.33 | 0.58 |
| w *by* s | 3.16 | 2.48 | 2,20 | 1.49 | 1.16 | 0.37 | w *by* n | 0.11 | 1.36 | |
| West. | 5.27 | 4.53 | 4.18 | 3.39 | 2.54 | 1.55 | | | | |
| w *by* n | | | | | 5.50 | 5.11 | | | | |
| ⊙ sets | 6.03 | 5.06 | 5.09 | 6.12 | 6.15 | 6.19 | ⊙ sets | 6.22 | 6.25 | 6.28 |
| Sun's | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | Sun's | d. m. | d. m. | d. m. |
| Amp. | 2.36 | 5.13 | 7.50 | 10.28 | 1.37 | 15.42 | Amp. | 18.19 | 20.57 | 23.42 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | |
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.13 | 0.15 | 0.17 | 0.19 | 0.21 | 0.33 | 0.25 | 0.27 | 0.29 | 0.31 |
| s s w | 0.28 | 0.32 | 0.36 | 0.39 | 0.43 | 0.47 | 0.52 | 0.56 | 1.01 | 1.04 |
| sw *by* s | 0.44 | 0.50 | 0.57 | 1.03 | 1.09 | 1.16 | 1.23 | 1.30 | 1,37 | 1.43 |
| s w | 1.05 | 1.14 | 1.24 | 1.33 | 1.42 | 1.51 | 2.06 | 2.13 | 2.23 | 2.32 |
| sw *by* w | 1.35 | 1.48 | 2.01 | 2.14 | 2.28 | 2.42 | 2.57 | 3.12 | 3.29 | 3.42 |
| w s w | 2.21 | 2.40 | 2.59 | 3.18 | 3.39 | 4.00 | 4.22 | 4.47 | 5.14 | 5.39 |
| w *by* s | 3.43 | 4.10 | 4.38 | 5.07 | 5.37 | | | | | |
| West. | 6.00 | | | | | | | | | |
| ⊙ sets | 6.00 | 5.57 | 5.54 | 5.51 | 5.48 | 5.45 | 5.41 | 5.38 | 5.35 | 5.32 |

## A Sun-Dial for the Latitude of 18 Degrees.

### North Declination.

| Deg. Min. | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | Points h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | Nort. 12 | 12 | 12 |
| *by* W | 0.12 | 0.10 | 0.08 | 0.06 | 0.04 | 0.02 | 0.00 | *n by* w 0.02 | 0.03 | 0.05 |
| S S W | 0.25 | 0.21 | 0.17 | 0.13 | 0.09 | 0.05 | 0.01 | N N W 0.04 | 0.07 | 0.10 |
| W *by* S | 0.40 | 0.34 | 0.28 | 0.21 | 0.15 | 0.09 | 0.01 | N W *by* N 0.06 | 0.12 | 0.16 |
| S W | 1.00 | 0.50 | 0.41 | 0.32 | 0.22 | 0.12 | 0.02 | N W 0.09 | 0.17 | 0.24 |
| W *by* W | 1.26 | 1.13 | 1.00 | 0.47 | 0.34 | 0.18 | 0.03 | N W *by* W 0.13 | 0.27 | 0.38 |
| W S W | 2.08 | 1.50 | 1.31 | 1.11 | 0.51 | 0.29 | 0.05 | W N W 0.21 | 0.45 | 1.06 |
| W *by* S | 3.23 | 2.57 | 2.29 | 2.00 | 1.29 | 0.53 | 0.10 | W *by* N 0.53 | | |
| West. | 5.29 | 4.57 | 4.24 | 3.49 | 3.08 | 2.18 | 0.56 | | | |
| W *by* N | | | | | 5.51 | 5.15 | 4.32 | | | |
| ☉ sets | 6.02 | 6.06 | 6.09 | 6.13 | 6.16 | 6.20 | 6.23 | ☉ sets 6.27 | 6.30 | 6.33 |
| Sun's Amp. | d. m. 2.37 | d. m. 5.15 | d. m. 7.53 | d. m. 10.31 | d. m. 13.9 | d. m. 15.47 | d. m. 18.26 | Sun's Amp. d. m. 21.4 | d. m. 23.12 | d. m. 24.48 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South- | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| S *by* W | 0.14 | 0.16 | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.28 | 0.30 | 0.32 | 0.33 |
| S S W | 0.29 | 0.33 | 0.37 | 0.41 | 0.45 | 0.49 | 0.53 | 0.58 | 1.02 | 1.06 | 1.08 |
| S W *by* S | 0.47 | 0.53 | 0.59 | 1.05 | 1.12 | 1.18 | 1.25 | 1.32 | 1.39 | 1.45 | 1.50 |
| S W | 1.09 | 1.18 | 1.27 | 1.36 | 1.46 | 1.55 | 2.05 | 2.15 | 2.26 | 2.35 | 2.42 |
| S W *by* W | 1.39 | 1.52 | 2.05 | 2.18 | 2.32 | 2.44 | 3.00 | 3.15 | 3.31 | 3.45 | 3.56 |
| W S W | 2.27 | 2.45 | 3.04 | 3.23 | 3.43 | 4.03 | 4.25 | 4.49 | 5.15 | 5.39 | |
| W *by* S | 3.49 | 4.15 | 4.41 | 5.09 | 5.38 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ☉ sets | 6.00 | 5.58 | 5.54 | 5.51 | 5.47 | 5.44 | 5.40 | 5.37 | 5.33 | 5.30 | 5.27 |

## *A Sun-Dial for the Latitude of 19 Degrees.*

### North Declination.

| Deg. Min. | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | Points | h m | h m | |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | Nort. | 12 | 12 | |
| s *by* w | 0.13 | 0.11 | 0.09 | 0.07 | 0.05 | 0.03 | 0.01 | n *by* w | 0.01 | 0.03 | 0 |
| s s w | 0.27 | 0.23 | 0.19 | 0.15 | 0.11 | 0.07 | 0.03 | n n w | 0.02 | 0.05 | 0 |
| sw *by* s | 0.43 | 0.37 | 0.30 | 0.24 | 0.18 | 0.11 | 0.05 | nw *by* n | 0.03 | 0.09 | 0 |
| s w | 1.03 | 0.54 | 0.45 | 0.36 | 0.27 | 0.17 | 0.07 | n w | 0.04 | 0.13 | 0 |
| sw *bw* | 1.35 | 1.18 | 1.05 | 0.52 | 0.38 | 0.24 | 0.09 | nw *by* w | 0.06 | 0.20 | 0 |
| w s w | 2.15 | 1.57 | 1.38 | 1.19 | 0.59 | 0.41 | 0.15 | w n w | 0.10 | 0.33 | 0 |
| w *by* s | 3.29 | 3.04 | 2.38 | 2.09 | 1.41 | 1.08 | 0.29 | w *by* n | 0.23 | | |
| West. | 5.31 | 5.01 | 4.30 | 3.57 | 3.20 | 2.36 | 1.35 | | | | |
| w *by* n | | | | | 5.52 | 5.17 | 4.40 | | | | |
| ⊙ set | 6.03 | 6.07 | 6.10 | 6.14 | 6.17 | 6.21 | 6.24 | ⊙ set | 6.28 | 6.31 | 6. |
| Sun's Amp. | d. m. 2.38 | d. m. 5.17 | d. m. 7.56 | d. m. 10.35 | d. m. 13.14 | d. m. 15.53 | d. m. 18.33 | Sun's Amp. | d. m. 21.12 | d. m. 23.20 | d. 24 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 2 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.15 | 0.17 | 0.19 | 0.21 | 0.23 | 0.25 | 0.27 | 0.29 | 0.31 | 0.32 | 0.3 |
| s s w | 0.31 | 0.35 | 0.38 | 0.42 | 0.46 | 0.50 | 0.54 | 0.58 | 1.03 | 1.07 | 1.0 |
| sw *by* s | 0.49 | 0.55 | 1.01 | 1.08 | 1.14 | 1.21 | 1.27 | 1.33 | 1.41 | 1.47 | 1.5 |
| s w | 1.12 | 1.21 | 1.30 | 1.39 | 1.48 | 1.58 | 2.07 | 2.16 | 2.29 | 2.37 | 2.4 |
| sw *by* w | 1.44 | 1.57 | 2.09 | 2.23 | 2.36 | 2.49 | 3.04 | 3.19 | 3.34 | 3.48 | 3.5 |
| w s w | 2.33 | 2.51 | 3.09 | 3.27 | 3.46 | 4.06 | 4.25 | 4.51 | 5.16 | 5.39 | |
| w *by* s | 4.54 | 4.19 | 4.44 | 5.10 | 5.39 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.57 | 5.53 | 5.50 | 5.46 | 5.43 | 5.39 | 5.36 | 5.32 | 5.29 | 5.26 |

## A Sun-Dial for the Latitude of 20 Degrees.

### North Declination.

| | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | Point | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | Nort. | 12 | 1 | 12 |
| by W | 0.14 | 0.12 | 0.10 | 0.08 | 0.06 | 0.04 | 0.02 | N by W | | 0.02 | 0.03 |
| S W | 0.28 | 0.25 | 0.21 | 0.17 | 0.13 | 0.09 | 0.05 | N N W | | 0.04 | 0.06 |
| W by S | 0.45 | 0.39 | 0.33 | 0.23 | 0.20 | 0.14 | 0.07 | NW by N | | 0.06 | 0.10 |
| S W | 1.07 | 0.58 | 0.49 | 0.40 | 0.30 | 0.21 | 0.11 | N W | | 0.09 | 0.16 |
| W by W | 1.36 | 1.23 | 1.10 | 0.58 | 0.44 | 0.30 | 0.15 | NW by W | | 0.13 | 0.24 |
| W W | 2.21 | 2.03 | 1.45 | 1.26 | 1.07 | 0.46 | 0.24 | W N W | | 0.22 | 0.40 |
| W by S | 3.37 | 3.11 | 2.45 | 2.20 | 1.52 | 1.21 | 0.45 | W by N | | | |
| West. | 5.32 | 5.04 | 4.35 | 4.00 | 3.30 | 2.50 | 2.00 | | | | |
| W by N | | | | | 5.54 | 5.23 | 4.47 | | | | |
| ⊙ sets | 6.03 | 6.07 | 6.11 | 6.15 | 6.18 | 6.22 | 6.26 | ⊙ sets | 6.30 | 6.33 | 6.36 |
| Sun's Amp. | d. m. 2.40 | d. m. 5.20 | d. m. 7.59 | d. m. 0.39 | d. m. 13.19 | d. m. 16.0 | d. m. 18.40 | Sun's Amp. | d. m. 21.20 | d. m. 23.29 | d. m. 25.8 |

Zen.

### South Declination.

| | 0 d | 2 d 30 | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| S by W | 0.16 | 0.17 | 0.19 | 0.21 | 0.23 | 0.25 | 0.27 | 0.29 | 0.31 | 0.33 | 0.33 |
| S S W | 0.32 | 0.36 | 0.40 | 0.44 | 0.48 | 0.52 | 0.56 | 1.00 | 1.05 | 1.08 | 1.11 |
| W by S | 0.51 | 0.58 | 1.04 | 1.10 | 1.12 | 1.23 | 1.29 | 1.36 | 1.43 | 1.49 | 1.53 |
| S W | 1.16 | 1.24 | 1.33 | 1.42 | 1.51 | 2.01 | 2.10 | 2.20 | 2.31 | 2.40 | 2.47 |
| W by W | 1.48 | 2.01 | 2.14 | 2.26 | 2.39 | 2.53 | 3.07 | 3.25 | 3.37 | 3.50 | 4.00 |
| W S W | 2.38 | 2.56 | 3.13 | 3.31 | 3.50 | 4.09 | 4.30 | 4.52 | 5.16 | 5.38 | |
| W by S | 3.59 | 4.23 | 4.47 | 5.12 | 5.38 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.57 | 5.52 | 5.49 | 5.45 | 5.42 | 5.38 | 5.34 | 5.30 | 5.27 | 5.24 |

## A Sun-Dial for the Latitude of 21 Degrees.

### North Declination.

| Deg. Min. | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | Points | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | North. | 12 |
| s *by* w | 0.14 | 0.13 | 0.11 | 0.09 | 0.07 | 0.05 | 0.03 | 0.01 | n *by* w | 0.01 |
| s s w | 0.30 | 0.26 | 0.22 | 0.18 | 0.14 | 0.10 | 0.06 | 0.02 | n n w | 0.02 |
| sw *b* s | 0.48 | 0.42 | 0.35 | 0.29 | 0.23 | 0.16 | 0.10 | 0.03 | nw *bn* | 0.03 |
| s w | 1.10 | 1.01 | 0.52 | 0.43 | 0.34 | 0.26 | 0.15 | 0.04 | n w | 0.04 |
| sw *bw* | 1.40 | 1.27 | 1.16 | 1.03 | 0.49 | 0.36 | 0.21 | 0.06 | nw *bw* | 0.06 |
| w s w | 2.26 | 2.05 | 1.52 | 1.29 | 1.15 | 0.55 | 0.33 | 0.10 | w n w | 0.11 |
| w *by* s | 3.41 | 3.18 | 2.54 | 2.29 | 2.03 | 1.33 | 1.06 | 0.20 | w *by* n | 0.24 |
| West. | 5.34 | 5.07 | 4.40 | 4.11 | 3.39 | 3.03 | 2.19 | 4.14 | | |
| w *by* n | | | | | 5.55 | 5.26 | 4.53 | 4.12 | | |
| ⊙ sets | 6.04 | 6.08 | 6.12 | 6.16 | 6.20 | 6.25 | 6.28 | 6.32 | ⊙ sets | 6.35 |
| Sun's Amp. | d. m. 2.41 | d. m. 5.21 | d. m. 8.02 | d. m. 10.43 | d. m. 13.24 | d. m. 16.6 | d. m. 18.47 | d. m. 21.29 | Sun's Amp. | d. m. 23.40 |

### South Declination.

| Deg. Min. | 0 | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 |
| s *by* w | 0.16 | 0.18 | 0.26 | 0.22 | 0.24 | 0.26 | 0.28 | 0.30 | 0.32 | 0.34 | 0 |
| s s w | 0.34 | 0.38 | 0.42 | 0.45 | 0.49 | 0.54 | 0.58 | 1.02 | 1.06 | 1.10 | 1 |
| sw *by* s | 0.54 | 1.00 | 1.06 | 1.12 | 1.19 | 1.25 | 1.32 | 1.38 | 1.45 | 1.51 | 1 |
| s w | 1.19 | 1.28 | 1.37 | 1.46 | 1.55 | 2.04 | 2.13 | 2.23 | 2.33 | 2.42 | 2 |
| sw *by* w | 1.53 | 2.05 | 2.18 | 2.30 | 2.43 | 2.56 | 3.10 | 3.24 | 3.39 | 5.52 | 4 |
| w s w | 2.43 | 3.01 | 3.18 | 3.35 | 3.54 | 4.12 | 4.32 | 4.53 | 5.17 | | |
| w *by* s | 4.04 | 4.27 | 4.50 | 5.14 | 5.39 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.56 | 5.52 | 5.48 | 5.44 | 5.40 | 5.35 | 5.32 | 5.28 | 5.25 | 5 |

## A Sun-Dial for the Latitude of 22 Degrees.

### North Declination.

| Deg. | 2 | d | 5 | d | 7 | d | 10 | d | 12 | d | 15 | d | 17 | d | 20 | d | | 22 | d | 23 | d |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 30m | | | | 30m | | | | 30m | | | | 30m | | | | | | | 30m | |
| Points | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | Points | h | m | h | m |
| South | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | North | 12 | | 12 | |
| s by w | 0.15 | | 0.13 | | 0.11 | | 0.09 | | 0.08 | | 0.06 | | 0.04 | | 0.02 | | n by w | | | 0.01 | |
| s s w | 0.31 | | 0.28 | | 0.24 | | 0.20 | | 0.16 | | 0.12 | | 0.08 | | 0.04 | | n n w | | | 0.03 | |
| s w by s | 0.50 | | 0.44 | | 0.42 | | 0.32 | | 0.25 | | 0.19 | | 0.13 | | 0.06 | | nw by n | | | 0.04 | |
| s w | 1.14 | | 1.05 | | 0.56 | | 0.47 | | 0.38 | | 0.29 | | 0.19 | | 0.08 | | n w | | | 0.07 | |
| s w by w | 1.45 | | 1.33 | | 1.20 | | 1.08 | | 0.55 | | 0.41 | | 0.27 | | 0.13 | | nw by w | | | 0.10 | |
| w s w | 2.30 | | 2.15 | | 1.58 | | 1.40 | | 1.22 | | 1.03 | | 0.42 | | 0.20 | | w n w | | | 0.17 | |
| w by s | 3.46 | | 3.24 | | 3.01 | | 2.39 | | 2.12 | | 1.45 | | 1.14 | | 0.37 | | | | | | |
| West. | 5.35 | | 5.10 | | 4.44 | | 4.17 | | 3.47 | | 3.14 | | 2.35 | | 1.43 | | | | | | |
| w by n | | | | | | | | | 5.56 | | 5.28 | | 4.58 | | 4.21 | | | | | | |
| ⊙ set | 6.04 | | 6.08 | | 6.12 | | 6.16 | | 6.20 | | 6.25 | | 6.29 | | 6.34 | | ⊙ set | 6.37 | | 6.40 | |
| Sun's Amp. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | Sun's Amp. | d. | m. | d. | m. |
| | 2. | 42 | 5. | 23 | 8. | 05 | 10. | 48 | 13. | 30 | 16. | 13 | 18. | 55 | 21. | 39 | | 23. | 50 | 25. | 29 |

### South Declination

| Deg. | 0 | d | 2 | d | 5 | d | 7 | d | 10 | d | 12 | d | 15 | d | 17 | d | 20 | d | 22 | d | 23 | d |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | | 30m | | | | 30m | | | | 30m | | | | 30m | | | | | | 30m | |
| Points | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m |
| South | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | |
| s by w | 0.17 | | 0.19 | | 0.21 | | 0.23 | | 0.25 | | 0.27 | | 0.28 | | 0.30 | | 0.32 | | 0.34 | | 0.35 | |
| s s w | 0.35 | | 0.39 | | 0.43 | | 0.47 | | 0.51 | | 0.55 | | 0.59 | | 1.03 | | 1.07 | | 1.11 | | 1.13 | |
| s w by s | 0.56 | | 1.02 | | 1.08 | | 1.14 | | 1.21 | | 1.27 | | 1.33 | | 1.40 | | 1.47 | | 1.52 | | 1.57 | |
| s w | 1.22 | | 1.31 | | 1.40 | | 1.49 | | 1.58 | | 2.07 | | 2.16 | | 2.25 | | 2.36 | | 2.44 | | 2.51 | |
| s w by w | 1.57 | | 2.09 | | 2.21 | | 2.34 | | 2.46 | | 2.59 | | 3.13 | | 3.27 | | 3.42 | | 3.54 | | 4.04 | |
| w s w | 2.49 | | 3.05 | | 3.22 | | 3.39 | | 3.57 | | 4.15 | | 4.34 | | 4.55 | | 5.17 | | | | | |
| w by s | 4.08 | | 4.30 | | 4.52 | | 5.15 | | 5.39 | | | | | | | | | | | | | |
| West. | 6.00 | | | | | | | | | | | | | | | | | | | | | |
| ⊙ set | 6.00 | | 5.56 | | 5.52 | | 5.48 | | 5.44 | | 5.40 | | 5.35 | | 5.31 | | 5.26 | | 5.22 | | 5.20 | |

## *A Sun Dial for the Latitude of 23 Degrees.*

### North Declination.

| Deg. | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | 30m | | 30m | | 30m | | 30m | | | | 30 |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | Points | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | Nort. | 1 |
| s *by* w | 0.16 | 0.15 | 0.13 | 0.11 | 0.09 | 0.07 | 0.05 | 0.03 | 0.01 | n *by* w | 0. |
| s s w | 0.33 | 0.30 | 0.26 | 0.22 | 0.18 | 0.14 | 0.10 | 0.05 | 0.02 | n n w | 0. |
| sw *by* s | 0.53 | 0.47 | 0.41 | 0.34 | 0.28 | 0.22 | 0.16 | 0.09 | 0.03 | nw *bn* | 0. |
| s w | 1.17 | 1.08 | 1.00 | 0.50 | 0.41 | 0.32 | 0.22 | 0.13 | 0.04 | n w | 0. |
| sw *bw* | 1.49 | 1.37 | 1.25 | 1.13 | 1.00 | 0.47 | 0.33 | 0.19 | 0.06 | nw *bw* | 0. |
| w s w | 2.37 | 2.21 | 2.04 | 1.47 | 1.29 | 1.11 | 0.51 | 0.29 | 0.10 | w n w | 0. |
| w *by* s | 3.51 | 3.30 | 3.08 | 2.45 | 2.21 | 1.55 | 1.26 | 0.59 | 0.20 | | |
| West. | 5.36 | 5.12 | 4.48 | 4.22 | 3.54 | 3.23 | 2.48 | 2.04 | 1.11 | | |
| w *by* n | | | | 6.21 | 5.57 | 5.31 | 5.02 | 4.29 | 3.56 | | |
| ⊙ set | 6.04 | 6.09 | 6.13 | 6.17 | 6.22 | 6.26 | 6.31 | 6.36 | 6.39 | ⊙ set. | 6. |
| Sun's | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | Sun's | d. |
| Amp. | 2.43 | 5.26 | 8.10 | 10.52 | 13.36 | 16.20 | 19.4 | 21.49 | 24.14 | Amp. | 25 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | 30 |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 |
| s *by* w | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.28 | 0.30 | 0.32 | 0.34 | 0.35 | 0. |
| s s w | 0.37 | 0.41 | 0.44 | 0.48 | 0.51 | 0.55 | 0.59 | 1.03 | 1.08 | 1.12 | 1. |
| s w *by* s | 0.59 | 1.04 | 1.10 | 1.16 | 1.23 | 1.29 | 1.35 | 1.41 | 1.49 | 1.54 | 1. |
| s w | 1.25 | 1.34 | 1.43 | 1.51 | 2.00 | 2.10 | 2.19 | 2.28 | 2.39 | 2.46 | 2. |
| sw *by* w | 2.01 | 2.13 | 2.25 | 2.37 | 2.50 | 3.02 | 3.16 | 3.29 | 3.44 | 3.56 | 4. |
| w s w | 2.53 | 3.10 | 3.26 | 3.43 | 4.00 | 4.17 | 4.36 | 4.56 | 5.17 | | |
| w *by* s | 4.12 | 4.33 | 4.54 | 5.16 | 5.39 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ set | 6.00 | 5.56 | 5.51 | 5.47 | 5.43 | 5.38 | 5.34 | 5.29 | 5.24 | 5.21 | 5. |

## A Sun-Dial for the Latitude of 24 Degrees.

### North Declination.

| eg. | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|
| in. | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| oint | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by w | 0.17 | 0.15 | 0.13 | 0.11 | 0.09 | 0.08 | 0.06 | 0.04 | 0.02 | 0.00 |
| s w | 0.35 | 0.35 | 0.27 | 0.23 | 0.19 | 0.15 | 0.11 | 0.07 | 0.04 | 0.01 |
| w by s | 0.55 | 0.49 | 0.43 | 0.37 | 0.30 | 0.24 | 0.18 | 0.11 | 0.06 | 0.01 |
| w | 1.20 | 1.12 | 1.03 | 0.53 | 0.44 | 0.35 | 0.25 | 0.17 | 0.09 | 0.02 |
| w bw | 1.54 | 1.42 | 1.30 | 1.18 | 1.05 | 0.52 | 0.39 | 0.21 | 0.13 | 0.03 |
| s w | 2.42 | 2.26 | 2.10 | 1.53 | 1.36 | 1.18 | 0.59 | 0.38 | 0.20 | 0.05 |
| by s | 3.56 | 3.35 | 3.14 | 2.52 | 2.29 | 2.05 | 1.34 | 1.07 | 0.33 | 0.10 |
| est. | 5.37 | 5.15 | 4.51 | 4.27 | 4.01 | 3.32 | 3.00 | 2.21 | 1.39 | 0.49 |
| by n | | | | 6.21 | 5.58 | 5.33 | 5.06 | 4.35 | 4.06 | 3.39 |
| n w | | | | | | | | | 6.24 | 6.09 |
| est. | 6.04 | 6.09 | 6.13 | 6.18 | 6.23 | 6.27 | 6.32 | 6.37 | 6.41 | 6.45 |
| n's | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| mp. | 2.44 | 5.28 | 8.13 | 10.57 | 13.42 | 16.27 | 19.13 | 21.59 | 24.12 | 25.54 |

### South Declination.

| eg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| in. | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| nts | 12 | 12 | 12 | 12 | 12 | 12 | 1 2 | 12 | 12 | 12 | 12 |
| outh | 0.18 | 0.20 | 0.22 | 0.24 | 0.26 | 0.28 | 0.29 | 0.31 | 0.33 | 0.35 | 0.37 |
| by w | 0.38 | 0.42 | 0.46 | 0.50 | 0.53 | 0.57 | 1.01 | 1.05 | 1.10 | 1.13 | 1.16 |
| s w | 1.01 | 1.07 | 1.13 | 1.19 | 1.25 | 1.31 | 1.37 | 1.44 | 1.50 | 1.56 | 2.00 |
| w by s | 1.29 | 1.37 | 1.46 | 1.54 | 2.04 | 2.13 | 2.23 | 2.32 | 2.40 | 2.49 | 2.55 |
| by w | 2.05 | 2.17 | 2.29 | 2.41 | 2.53 | 3.05 | 3.18 | 3.32 | 3.46 | 3.58 | 4.08 |
| s w | 2.58 | 3.14 | 3.30 | 3.46 | 4.02 | 4.20 | 4.38 | 4.57 | 5.18 | | |
| by s | 4.16 | 4.36 | 4.56 | 5.17 | 5.39 | | | | | | |
| est. | 6.00 | | | | | | | | | | |
| ven | 6.00 | 5.56 | 5.51 | 5.47 | 5.42 | 5.37 | 5.33 | 5.28 | 5.23 | 5.19 | 5.15 |

## A Sun-Dial for the Latitude of 25 Degrees.

### North Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s *by* w | 0.19 | 0.17 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.06 | 0.04 | 0.02 | 0 |
| s s w | 0.40 | 0.36 | 0.32 | 0.29 | 0.25 | 0.21 | 0.17 | 0.13 | 0.09 | 0.05 | 0 |
| sw *by* s | 1.03 | 0.57 | 0.51 | 0.45 | 0.39 | 0.33 | 0.27 | 0.21 | 0.14 | 0.09 | 0 |
| s w | 1.32 | 1.23 | 1.15 | 1.05 | 0.57 | 0.49 | 0.40 | 0.31 | 0.21 | 0.13 | 0 |
| sw *bw* | 2.09 | 1.58 | 1.46 | 1.35 | 1.22 | 1.10 | 0.58 | 0.44 | 0.31 | 0.19 | 0 |
| w s w | 3.02 | 2.47 | 2.32 | 2.16 | 2.00 | 1.43 | 1.25 | 1.07 | 0.47 | 0.29 | 0 |
| w *by* s | 4.19 | 4.00 | 3.40 | 3.20 | 2.59 | 2.37 | 2.14 | 1.48 | 1.19 | 0.53 | 0 |
| West. | 6.00 | 5.38 | 5.17 | 4.54 | 4.31 | 4.06 | 3.40 | 3.10 | 2.39 | 2.00 | 1. |
| w *by* n | | | | | 6.21 | 5.59 | 5.36 | 5.10 | 4.41 | 4.14 | 3 |
| w n w | | | | | | | | | | 6.25 | 6 |
| ⊙ set. | 6.00 | 6.05 | 6.09 | 6.14 | 6.19 | 6.24 | 6.29 | 6.34 | 6.36 | 6.43 | 6. |
| Sun's Amp. | d. m. 0.00 | d. m. 2.45 | d. m. 5.31 | d. m. 8.16 | d. m. 11.3 | d. m. 12.40 | d. m. 16.35 | d. m. 19.22 | d. m. 22.10 | d. m. 24.25 | d. 2 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | |
| points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s *by* w | 0.19 | 0.21 | 0.23 | 0.25 | 0.27 | 0.28 | 0.30 | 0.32 | 0.34 | 0.36 | 0. |
| s s w | 0.40 | 0.43 | 0.47 | 0.51 | 0.55 | 0.59 | 1.02 | 1.06 | 1.11 | 1.14 | 1. |
| sw *by* s | 1.03 | 1.09 | 1.15 | 1.21 | 1.27 | 1.33 | 1.39 | 1.46 | 1.52 | 1.58 | 2. |
| s w | 1.32 | 1.40 | 1.48 | 1.57 | 2.06 | 2.14 | 2.23 | 2.33 | 2.42 | 2.50 | 2. |
| sw *by* w | 2.09 | 2.21 | 2.32 | 2.44 | 2.56 | 3.08 | 3.21 | 3.34 | 3.48 | 4.00 | 4 |
| w s w | 3.02 | 3.18 | 3.33 | 3.49 | 4.05 | 4.22 | 4.39 | 4.58 | 5.19 | | |
| w *by* s | 4.19 | 4.39 | 4.58 | 5.18 | 5.39 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ set. | 6.00 | 5.55 | 5.51 | 5.46 | 5.41 | 5.26 | 5.31 | 5.26 | 5.21 | 5.17 | 5. |

## A Sun-Dial for the Latitude of 26 Degrees.

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.20 | 0.18 | 0.16 | 0.14 | 0.13 | 0.11 | 0.09 | 0.07 | 0.05 | 0.03 | 0.02 |
| S W | 0.41 | 0.38 | 0.34 | 0.30 | 0.26 | 0.23 | 0.19 | 0.15 | 0.11 | 0.07 | 0.04 |
| W by S | 1.05 | 0.59 | 0.54 | 0.48 | 0.42 | 0.36 | 0.30 | 0.24 | 0.17 | 0.11 | 0.07 |
| S W | 1.35 | 1.26 | 1.18 | 1.10 | 1.01 | 0.52 | 0.43 | 0.34 | 0.25 | 0.17 | 0.11 |
| W by W | 2.13 | 2.02 | 1.50 | 1.39 | 1.27 | 1.15 | 1.03 | 0.50 | 0.36 | 0.25 | 0.16 |
| W S W | 3.07 | 2.52 | 2.37 | 2.21 | 2.06 | 1.49 | 1.32 | 1.14 | 0.55 | 0.38 | 0.25 |
| W by S | 4.22 | 4.04 | 3.45 | 3.25 | 3.06 | 2.45 | 2.18 | 1.58 | 1.31 | 1.07 | 0.45 |
| West. | 6.00 | 5.39 | 5.19 | 4.57 | 4.35 | 4.12 | 3.47 | 3.19 | 2.47 | 2.16 | 1.47 |
| W by N | | | | | 6.21 | 6.00 | 5.38 | 5.13 | 4.46 | 4.22 | 4.00 |
| N W | | | | | | | | | 6.42 | 6.25 | 6.12 |
| ☉ sets | 6.00 | 6.05 | 6.10 | 6.15 | 6.20 | 6.25 | 6.30 | 6.35 | 6.41 | 6.45 | 6.49 |
| Sun's Amp. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. |
| | 0.00 | 2.46 | 5.34 | 8.20 | 11.8 | 13.56 | 16.44 | 19.33 | 22.22 | 21.38 | 26.22 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.20 | 0.22 | 0.24 | 0.25 | 0.27 | 0.29 | 0.31 | 0.33 | 0.35 | 0.36 | 0.38 |
| S W | 0.41 | 0.45 | 0.49 | 0.52 | 0.56 | 1.00 | 1.04 | 1.08 | 1.12 | 1.15 | 1.18 |
| W by S | 1.05 | 1.11 | 1.17 | 1.23 | 1.29 | 1.35 | 1.41 | 1.47 | 1.54 | 1.59 | 2.03 |
| S W | 1.35 | 1.43 | 1.51 | 2.00 | 2.08 | 2.17 | 2.26 | 2.35 | 2.44 | 2.52 | 2.59 |
| W by W | 2.13 | 2.24 | 2.36 | 2.47 | 2.59 | 3.11 | 3.23 | 3.36 | 3.50 | 4.01 | 4.10 |
| W S W | 3.07 | 3.21 | 3.37 | 3.52 | 4.07 | 4.24 | 4.41 | 4.59 | 5.18 | | |
| W by S | 4.22 | 4.41 | 5.00 | 5.19 | | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ☉ sets | 6.00 | 5.55 | 5.50 | 5.45 | 5.40 | 5.35 | 5.30 | 5.25 | 5.19 | 5.15 | 5.11 |

## A Sun-Dial for the Latitude of 27 Degrees.

### North Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | | | | | | | | | |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s by w | 0.21 | 0.19 | 0.17 | 0.15 | 0.13 | 0.12 | 0.10 | 0.08 | 0.06 | 0.04 |
| s s w | 0.43 | 0.39 | 0.35 | 0.32 | 0.28 | 0.24 | 0.20 | 0.17 | 0.12 | 0.09 |
| s w by s | 1.07 | 1.02 | 0.56 | 0.50 | 0.45 | 0.39 | 0.33 | 0.27 | 0.20 | 0.13 |
| s w | 1.38 | 1.30 | 1.21 | 1.13 | 1.05 | 0.56 | 0.47 | 0.38 | 0.29 | 0.21 |
| s w by w | 2.17 | 2.06 | 1.55 | 1.43 | 1.32 | 1.20 | 1.08 | 0.55 | 0.42 | 0.32 |
| w s w | 3.10 | 2.56 | 2.41 | 2.26 | 2.11 | 1.55 | 1.39 | 1.22 | 1.03 | 0.47 |
| w by s | 4.25 | 4.07 | 3.49 | 3.31 | 3.11 | 2.51 | 2.30 | 2.07 | 1.42 | 1.19 |
| West. | 6.00 | 5.40 | 5.21 | 5.00 | 4.39 | 4.17 | 3.53 | 3.27 | 2.58 | 2.30 |
| w by n | | | | | 6.21 | 6.01 | 5.39 | 5.17 | 4.51 | 4.28 |
| w n w | | | | | | | | | 6.42 | 6.20 |
| ☉ sets | 6.00 | 6.05 | 6.10 | 6.15 | 6.21 | 6.26 | 6.31 | 6.37 | 6.43 | 6.48 |
| Sun's Asmp. | d. m. 0.00 | d. m. 2.48 | d. m. 5.36 | d. m. 8.25 | d. m. 11.14 | d. m. 14.3 | d. m. 16.53 | d. m. 19.43 | d. m. 22.34 | d. m. 24.52 |

### South Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 20m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | | | | | | | | | |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 | 12 | 12 |
| s by w | 0.21 | 0.23 | 0.24 | 0.26 | 0.28 | 0.30 | 0.32 | 0.34 | 0.36 | 0.37 |
| s s w | 0.43 | 0.46 | 0.50 | 0.53 | 0.57 | 1.01 | 1.05 | 1.09 | 1.13 | 1.16 |
| s w by s | 1.07 | 1.13 | 1.19 | 1.25 | 1.30 | 1.36 | 1.42 | 1.48 | 1.55 | 2.02 |
| s w | 1.38 | 1.46 | 1.54 | 2.02 | 2.11 | 2.19 | 2.28 | 2.37 | 2.46 | 2.54 |
| s w by w | 2.17 | 2.28 | 2.39 | 2.50 | 3.02 | 3.13 | 3.26 | 3.38 | 3.52 | 4.01 |
| w s w | 3.10 | 3.25 | 3.40 | 3.54 | 4.10 | 4.25 | 4.42 | 4.59 | 5.18 | |
| w by s | 4.25 | 4.43 | 5.02 | 5.20 | 5.39 | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.55 | 5.50 | 5.45 | 5.39 | 5.34 | 5.29 | 5.23 | 5.17 | 5.12 |

## A Sun-Dial for the Latitude of 28 Degrees.

### North Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hours | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| North. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.21 | 0.20 | 0.18 | 0.16 | 0.14 | 0.13 | 0.11 | 0.09 | 0.07 | 0.05 | 0.04 |
| N W | 0.44 | 0.40 | 0.37 | 0.33 | 0.30 | 0.26 | 0.22 | 0.18 | 0.14 | 0.11 | 0.08 |
| N by W | 1.10 | 1.04 | 0.58 | 0.53 | 0.47 | 0.41 | 0.35 | 0.29 | 0.22 | 0.16 | 0.13 |
| N W | 1.41 | 1.33 | 1.25 | 1.17 | 1.08 | 1.00 | 0.51 | 0.42 | 0.35 | 0.25 | 0.19 |
| N by W | 2.20 | 2.10 | 1.59 | 1.48 | 1.36 | 1.25 | 1.13 | 1.05 | 0.48 | 0.37 | 0.28 |
| N W | 3.14 | 3.00 | 2.46 | 2.31 | 2.17 | 2.01 | 1.45 | 1.29 | 1.11 | 0.55 | 0.43 |
| N by W | 4.28 | 4.11 | 3.53 | 3.39 | 3.17 | 3.00 | 2.38 | 2.16 | 1.52 | 1.31 | 1.13 |
| N. | 6.00 | 5.41 | 5.22 | 5.04 | 4.43 | 4.21 | 3.59 | 3.39 | 3.07 | 2.42 | 2.20 |
| N E | | | | | 6.21 | 6.04 | 5.41 | 5.21 | 4.56 | 4.34 | 4.16 |
| N W | | | | | | | | | 6.42 | 6.27 | 6.14 |
| East | 6.00 | 6.05 | 6.11 | 6.16 | 6.22 | 6.27 | 6.33 | 6.39 | 6.45 | 6.50 | 6.53 |
| Rise | d. m. | d. m | d. m | d. m | d. m. | d. m. | d. m. | d. m. | d. m. | d. m | d. m. |
| Amp. | 0.00 | 2.50 | 5.40 | 8.30 | 11.21 | 14.11 | 17.3 | 19.56 | 22.48 | 25.6 | 26.52 |

### South Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hours | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.21 | 0.23 | 0.25 | 0.27 | 0.28 | 0.30 | 0.32 | 0.34 | 0.36 | 0.38 | 0.39 |
| S W | 0.44 | 0.48 | 0.51 | 0.55 | 0.58 | 1.02 | 1.06 | 1.10 | 1.14 | 1.17 | 1.20 |
| S by W | 1.10 | 1.15 | 1.21 | 1.27 | 1.32 | 1.38 | 1.44 | 1.51 | 1.57 | 2.03 | 2.06 |
| S W | 1.41 | 1.49 | 1.57 | 2.05 | 2.13 | 2.21 | 2.30 | 2.39 | 2.47 | 2.56 | 3.02 |
| S by W | 2.20 | 2.31 | 2.42 | 2.53 | 3.04 | 3.16 | 3.28 | 3.40 | 3.53 | 4.04 | 4.13 |
| S W | 3.14 | 3.28 | 3.43 | 3.57 | 4.12 | 4.27 | 4.43 | 5.00 | 5.18 | | |
| S by W | 4.28 | 4.45 | 5.03 | 5.21 | 5.39 | | | | | | |
| S. | 6.00 | | | | | | | | | | |
| West | 6.00 | 5.55 | 5.49 | 5.44 | 5.38 | 5.33 | 5.27 | 5.21 | 5.15 | 5.10 | 5.07 |

## *A Sun-Dial for the Latitude of* 29 *Degrees.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s *by* w | 0.22 | 0.20 | 0.19 | 0.17 | 0.15 | 0.13 | 0.11 | 0.10 | 0.08 | 0.06 | 0 |
| s s w | 0.45 | 0.42 | 0.38 | 0.35 | 0.31 | 0.27 | 0.23 | 0.19 | 0.16 | 0.12 | 0 |
| s w *by* s | 1.12 | 1.06 | 1.01 | 0.55 | 0.49 | 0.43 | 0.37 | 0.31 | 0.25 | 0.20 | 0 |
| s w | 1.43 | 1.36 | 1.28 | 1.20 | 1.12 | 1.03 | 0.55 | 0.46 | 0.37 | 0.29 | 0 |
| sw *by* w | 2.24 | 2.13 | 2.03 | 1.52 | 1.41 | 1.30 | 1.18 | 1.06 | 0.53 | 0.42 | 0 |
| w s w | 3.18 | 3.04 | 2.50 | 2.36 | 2.22 | 2.07 | 1.52 | 1.35 | 1.18 | 1.03 | 0 |
| w *by* s | 4.31 | 4.31 | 4.57 | 3.40 | 3.22 | 3.04 | 2.45 | 2.24 | 2.01 | 1.41 | 1 |
| West. | 6.00 | 5.42 | 5.24 | 5.05 | 4.46 | 4.26 | 4.04 | 3.41 | 3.16 | 2.53 | 2 |
| w *by* n | | | | | 6.21 | 6.02 | 5.43 | 5.22 | 5.00 | 4.40 | 4 |
| w n w | | | | | | | | | 6.42 | 6.27 | 6 |
| ⊙ sets | 6.00 | 6.06 | 6.11 | 6.17 | 6.23 | 6.28 | 6.34 | 6.40 | 6.47 | 6.52 | 6 |
| Sun's | d.m. | d. m | d. m | d. m | d.m. | d.m. | d.m. | d.m. | d.m. | d. m | d. m |
| Amp. | 0.00 | 2.51 | 5.43 | 8.34 | 11.27 | 14.19 | 17.12 | 20.8 | 24.32 | 25.22 | |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s *by* w | 0.22 | 0.24 | 0.26 | 0.27 | 0.29 | 0.31 | 0.33 | 0.35 | 0.37 | 0.38 | 0 |
| s s w | 0.45 | 0.49 | 0.53 | 0.56 | 1.00 | 1.04 | 1.08 | 1.11 | 1.15 | 1.18 | 1 |
| sw *by* s | 1,12 | 1.17 | 1.23 | 1.29 | 1.34 | 1.40 | 1.46 | 1.52 | 1.59 | 2.04 | 2 |
| s w | 1.43 | 1.51 | 1.59 | 2.07 | 2.15 | 2.24 | 2.32 | 2.41 | 2.50 | 2.58 | 3 |
| sw *by* w | 2.24 | 2.34 | 2.45 | 2.56 | 3.07 | 3.18 | 3.30 | 3.42 | 3.55 | 4.05 | |
| w s w | 4.13 | 1.32 | 3.46 | 4.00 | 4.14 | 4.29 | 4.44 | 5.00 | | | |
| w *by* s | 5.34 | 4.48 | 5.04 | 5.22 | 5.39 | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.54 | 5.49 | 5.43 | 5.37 | 5.32 | 5.26 | 5.20 | 5.12 | 5.08 | |

## *A Sun-Dial for the Latitude of 30 Degrees.*

### North Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| North | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.23 | 0.21 | 0.19 | 0.18 | 0.16 | 0.14 | 0.12 | 0.10 | 0.08 | 0.07 | 0.06 |
| N W | 0.47 | 0.43 | 0.40 | 0.36 | 0.33 | 0.29 | 0.25 | 0.21 | 0.17 | 0.14 | 0.12 |
| W by N | 1.14 | 1.08 | 1.03 | 0.58 | 0.52 | 0.46 | 0.40 | 0.34 | 0.28 | 0.23 | 0.19 |
| W | 1.46 | 1.38 | 1.31 | 1.23 | 1.15 | 1.07 | 0.58 | 0.50 | 0.41 | 0.33 | 0.27 |
| W by W | 2.27 | 2.17 | 2.06 | 1.56 | 1.45 | 1.34 | 1.23 | 1.11 | 0.58 | 0.48 | 0.40 |
| N W by W | 3.21 | 3.08 | 2.55 | 2.41 | 2.27 | 2.13 | 1.58 | 1.42 | 1.25 | 1.11 | 0.59 |
| W by N | 4.33 | 4.17 | 4.01 | 3.44 | 3.27 | 3.10 | 2.51 | 2.31 | 2.10 | 1.51 | 1.35 |
| West | 6.00 | 5.43 | 5.25 | 5.07 | 4.49 | 4.30 | 4.09 | 3.48 | 3.24 | 3.02 | 2.44 |
| by N | | | | | 6.21 | 6.03 | 5.45 | 5.25 | 5. 3 | 4.45 | 4.29 |
| N W | | | | | | | | | 6.02 | 6.28 | 6.17 |
| Sets | 6.00 | 6.06 | 6.12 | 6.18 | 6.23 | 6.29 | 6.36 | 6.42 | 6.48 | 6.54 | 6.59 |
| Rises | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| Amp. | 0.00 | 2.53 | 5.46 | 8.40 | 11.34 | 14.28 | 17.22 | 20.18 | 23.16 | 25.38 | 27.25 |

### South Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.23 | 0.24 | 0.26 | 0.28 | 0.30 | 0.31 | 0.33 | 0.35 | 0.37 | 0.39 | 0.40 |
| S W | 0.47 | 0.50 | 0.54 | 0.57 | 1.01 | 1.05 | 1.08 | 1.12 | 1.16 | 1.19 | 1.22 |
| W by S | 1.14 | 1.19 | 1.25 | 1.30 | 1.36 | 1.42 | 1.48 | 1.54 | 2.00 | 2.05 | 2.09 |
| W | 1.46 | 1.54 | 2.02 | 2.10 | 2.18 | 2.26 | 2.34 | 2.43 | 2.52 | 2.59 | 3.05 |
| W by W | 2.27 | 2.38 | 2.48 | 2.58 | 3.09 | 3.20 | 3.32 | 3.43 | 3.56 | 4.06 | 4.14 |
| S W | 3.21 | 3.35 | 3.48 | 4.01 | 4.16 | 4.30 | 4.45 | 5.01 | | | |
| W by S | 3.33 | 4.49 | 5.05 | 5.22 | 5.39 | | | | | | |
| West | 6.00 | | | | | | | | | | |
| Sets | 6.00 | 5.54 | 5.48 | 5.42 | 5.37 | 5.31 | 5.24 | 5.18 | 5.12 | 5.06 | 5.01 |

## *A Sun-Dial for the Latitude of* 31 *Degrees.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| *s by w* | 0.23 | 0.22 | 0.20 | 0.18 | 0.17 | 0.15 | 0.13 | 0.11 | 0.09 | 0.08 |
| *ssw* | 0.48 | 0.45 | 0.41 | 0.38 | 0.34 | 0.31 | 0.27 | 0.23 | 0.19 | 0.16 |
| *sw bys* | 1.16 | 1.11 | 1.05 | 1.00 | 0.54 | 0.48 | 0.43 | 0.37 | 0.31 | 0.25 |
| *sw* | 1.49 | 1.41 | 1.34 | 1.26 | 1.18 | 1.10 | 1.02 | 0.53 | 0.45 | 0.37 |
| *sw bw* | 2.30 | 2.20 | 2.10 | 2.00 | 1.49 | 1.38 | 1.27 | 1.16 | 1.04 | 0.54 |
| *w s w* | 3.25 | 3.12 | 2.59 | 2.45 | 2.32 | 2.18 | 2.03 | 1.48 | 1.32 | 1.18 |
| *w by s* | 4.36 | 4.20 | 4.04 | 3.48 | 3.32 | 3.15 | 2.57 | 2.38 | 2.18 | 2.00 |
| West. | 6.00 | 5.43 | 5.26 | 5.09 | 4.52 | 4.33 | 4.14 | 3.53 | 3.31 | 3.11 |
| *w byn* | | | | | 6.21 | 6.04 | 5.46 | 5.27 | 5.07 | 4.49 |
| *w n w* | | | | | | | | | 6.43 | 6.29 |
| ☉ set | 6.00 | 6.06 | 6.12 | 6.18 | 6.24 | 6.31 | 6.37 | 6.44 | 6.51 | 6.56 |
| Sun's Amp. | d.m. 0.00 | d.m. 2.55 | d.m. 5.50 | d.m. 8.45 | d.m. 11.41 | d.m. 14.37 | d.m. 17.34 | d.m. 20.31 | d.m. 23.31 | d.m. 25.55 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| *s by w* | 0.23 | 0.25 | 0.27 | 0.28 | 0.30 | 0.32 | 0.34 | 0.36 | 0.38 | 0.39 |
| *ssw* | 0.48 | 0.52 | 0.55 | 0.59 | 1.02 | 1.06 | 1.10 | 1.13 | 1.17 | 1.20 |
| *sw bys* | 1.16 | 1.21 | 1.27 | 1.32 | 1.38 | 1.44 | 1.49 | 1.55 | 2.01 | 2.07 |
| *sw* | 1.49 | 1.57 | 2.04 | 2.12 | 2.20 | 2.28 | 2.36 | 2.45 | 2.53 | 3.01 |
| *sw bywb* | 2.30 | 2.41 | 2.51 | 3.01 | 3.12 | 3.33 | 3.34 | 3.45 | 3.57 | 4.07 |
| *w s w* | 3.25 | 3.38 | 3.51 | 4.04 | 4.18 | 4.32 | 4.46 | 5.01 | 5.17 | |
| *w by s* | 4.36 | 4.50 | 5.07 | 5.23 | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.54 | 5.48 | 5.42 | 5.36 | 5.29 | 5.23 | 5.16 | 5.09 | 5.04 |

## *A Sun-Dial for the Latitude of 32 Degrees.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by w | 0.24 | 0.22 | 0.21 | 0.19 | 0.17 | 0.16 | 0.14 | 0.12 | 0.10 | 0.09 | 0.07 |
| s w | 0.50 | 0.46 | 0.43 | 0.39 | 0.36 | 0.32 | 0.29 | 0.25 | 0.21 | 0.18 | 0.15 |
| w by s | 1.18 | 1.13 | 1.07 | 1.02 | 0.56 | 0.51 | 0.45 | 0.39 | 0.33 | 0.28 | 0.24 |
| s w | 1.52 | 1.44 | 1.37 | 1.29 | 1.22 | 1.14 | 1.05 | 0.56 | 0.48 | 0.41 | 0.36 |
| w bw | 2.34 | 2.24 | 2.14 | 2.04 | 1.54 | 1.43 | 1.32 | 1.21 | 1.09 | 0.59 | 0.51 |
| s w | 3.28 | 3.15 | 3.03 | 2.50 | 2.37 | 2.23 | 2.09 | 1.54 | 1.39 | 1.25 | 1.15 |
| by s | 4.38 | 4.23 | 4.08 | 3.52 | 3.37 | 3.20 | 3.03 | 2.45 | 2.26 | 2.09 | 1.55 |
| West. | 6.00 | 5.44 | 5.28 | 5.11 | 4.55 | 4.37 | 4.21 | 3.59 | 3.38 | 3.19 | 3.04 |
| by n | | | | | 6.22 | 6.05 | 5.48 | 5.30 | 5.10 | 4.53 | 4.39 |
| n w | | | | | | | | | 6.43 | 6.30 | 6.19 |
| Differ. | 6.00 | 6.06 | 6.13 | 6.19 | 6.25 | 6.32 | 6.39 | 6.46 | 6.53 | 6.58 | 7.03 |
| Sun's Amp. | d.m. 3.00 | d.m. 2.57 | d.m. 5.54 | d.m. 8.51 | d.m. 11.48 | d.m. 14.47 | d.m. 17.46 | d.m. 19.47 | d.m. 22.47 | d.m. 26.43 | d.m. 28.3 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by w | 0.24 | 0.26 | 0.27 | 0.29 | 0.31 | 0.33 | 0.34 | 0.36 | 0.38 | 0.40 | 0.41 |
| s w | 0.50 | 0.53 | 0.56 | 1.00 | 1.03 | 1.07 | 1.10 | 1.14 | 1.18 | 1.21 | 1.24 |
| w by s | 1.18 | 1.23 | 1.29 | 1.34 | 1.40 | 1.45 | 1.51 | 1.57 | 2.03 | 2.08 | 2.12 |
| s w | 1.52 | 1.59 | 2.07 | 2.14 | 2.22 | 2.30 | 2.38 | 2.45 | 2.51 | 3.02 | 3.08 |
| w by w | 2.34 | 2.44 | 2.54 | 3.04 | 3.14 | 3.25 | 3.35 | 3.47 | 3.59 | 4.08 | 4.16 |
| w s w | 3.28 | 3.41 | 3.53 | 4.06 | 4.19 | 4.33 | 4.47 | 5.02 | | | |
| w by s | 4.38 | 4.53 | 5.08 | 5.53 | | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| Differs | 6.00 | 5.54 | 5.47 | 5.41 | 5.35 | 5.28 | 5.21 | 5.14 | 5.07 | 5.02 | 4.57 |

## *A Sun-Dial for the Latitude of* 33 *Degrees.*

### North Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | 3 |
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s *by* w | 0.25 | 0.23 | 0.21 | 0.20 | 0.18 | 0.16 | 0.15 | 0.13 | 0.11 | 0.09 | 0. |
| s s w | 0.51 | 0.47 | 0.44 | 0.41 | 0.37 | 0.34 | 0.30 | 0.27 | 0.23 | 0.19 | 0. |
| sw *by* s | 1.20 | 1.15 | 1.09 | 1.04 | 0.59 | 0.53 | 0.48 | 0.42 | 0.36 | 0.31 | 0. |
| s w | 1.54 | 1.47 | 1.40 | 1.32 | 1.24 | 1.17 | 1.09 | 1.01 | 0.53 | 0.46 | 0. |
| sw *bw* | 2.37 | 2.27 | 2.17 | 2.07 | 1.57 | 1.47 | 1.36 | 1.25 | 1.14 | 1.04 | 1. |
| w s w | 3.31 | 3.19 | 3.06 | 2.54 | 2.41 | 2.28 | 2.14 | 2.00 | 1.45 | 1.32 | 1. |
| w *by* s | 4.40 | 4.25 | 4.11 | 3.56 | 3.41 | 3.25 | 3.09 | 2.51 | 2.33 | 2.17 | 2. |
| West. | 6.00 | 5.45 | 5.29 | 5.13 | 4.57 | 4.40 | 4.23 | 4.04 | 3.44 | 3.26 | 3. |
| w *by* n | | | | | 6.21 | 6.05 | 5.49 | 5.32 | 5.15 | 4.57 | 4. |
| w n w | | | | | | | | | 6.43 | 6.30 | 6. |
| ☉ set. | 6.00 | 6.07 | 6.13 | 6.20 | 6.26 | 6.33 | 6.40 | 6.47 | 6.55 | 7.01 | 7. |
| Sun's | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d. |
| Amp. | 0.00 | 2.59 | 5.58 | 8.57 | 11.57 | 14.57 | 17.58 | 21.1 | 24.20 | 26.31 | 29 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | 3 |
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 1 |
| s *by* w | 0.25 | 0.26 | 0.28 | 0.30 | 0.31 | 0.33 | 0.35 | 0.37 | 0.39 | 0.40 | 0. |
| s s w | 0.51 | 0.54 | 0.58 | 1.01 | 1.05 | 1.08 | 1.12 | 1.15 | 1.19 | 1.22 | 1. |
| sw *by* s | 1.20 | 1.25 | 1.30 | 1.36 | 1.41 | 1.47 | 1.52 | 1.58 | 2.04 | 2.09 | 2. |
| s w | 1.54 | 2.02 | 2.09 | 2.17 | 2.24 | 2.32 | 2.40 | 2.48 | 2.58 | 3.09 | 3. |
| sw *by* w | 2.37 | 2.46 | 2.56 | 3.06 | 3.16 | 3.27 | 3.37 | 3.48 | 4.00 | 4.09 | 4. |
| w s w | 3.31 | 3.43 | 3.56 | 4.08 | 4.21 | 4.34 | 4.48 | 5.02 | | | |
| w *by* s | 4.40 | 4.54 | 5.09 | 5.24 | | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ☉ sets | 6.00 | 5.53 | 5.47 | 5.40 | 5.34 | 5.27 | 5.20 | 5.13 | 5.05 | 4.59 | 4. |

## *A Sun-Dial for the Latitude of 34 Degrees.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| *s by w* | 0.25 | 0.24 | 0.22 | 0.20 | 0.19 | 0.17 | 0.15 | 0.14 | 0.12 | 0.10 | 0.09 |
| *s s w* | 0.52 | 0.49 | 0.45 | 0.42 | 0.39 | 0.35 | 0.32 | 0.28 | 0.24 | 0.21 | 0.19 |
| *sw by s* | 1.22 | 1.17 | 1.12 | 1.07 | 1.01 | 0.56 | 0.50 | 0.44 | 0.38 | 0.34 | 0.30 |
| *s w* | 1.57 | 1.50 | 1.42 | 1.35 | 1.28 | 1.20 | 1.12 | 1.04 | 0.56 | 0.49 | 0.43 |
| *sw by w* | 2.40 | 2.30 | 2.21 | 2.11 | 2.01 | 1.51 | 1.41 | 1.30 | 1.19 | 1.09 | 1.02 |
| *w s w* | 3.34 | 3.22 | 3.10 | 2.58 | 2.45 | 2.33 | 2.19 | 2.06 | 1.51 | 1.39 | 1.29 |
| *w by s* | 4.42 | 4.28 | 4.14 | 3.59 | 3.45 | 3.30 | 3.14 | 2.57 | 2.40 | 2.24 | 2.12 |
| West. | 6.00 | 5.45 | 5.30 | 5.15 | 5.00 | 4.43 | 4.26 | 4.09 | 3.49 | 3.33 | 3.19 |
| *w by n* | | | | | 6.21 | 6.06 | 5.50 | 5.32 | 5.16 | 5.01 | 4.49 |
| *w n w* | | | | | | | | | 6.43 | 6.31 | 6.21 |
| ☉ set | 6.00 | 6.07 | 6.14 | 6.20 | 6.27 | 6.34 | 6.42 | 6.49 | 6.57 | 7.03 | 7.08 |
| Sun's Amp. | d. m. 0.00 | d. m. 3.01 | d. m. 6.01 | d. m. 9.03 | d. m. 12.5 | d. m. 15.8 | d. m. 18.12 | d. m. 21.16 | d. m. 24.22 | d. m. 26.52 | d. m. 28.45 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Point. | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| *s by w* | 0.25 | 0.27 | 0.29 | 0.30 | 0.32 | 0.34 | 0.35 | 0.37 | 0.39 | 0.41 | 0.42 |
| *s s w* | 0.52 | 0.55 | 0.59 | 1.02 | 1.06 | 1.09 | 1.13 | 1.16 | 1.20 | 1.23 | 1.26 |
| *sw by s* | 1.22 | 1.27 | 1.32 | 1.38 | 1.43 | 1.48 | 1.54 | 2.00 | 2.05 | 2.10 | 2.14 |
| *s w* | 1.57 | 2.04 | 2.11 | 2.19 | 2.26 | 2.34 | 2.42 | 2.50 | 2.58 | 3.05 | 3.10 |
| *sw by w* | 2.40 | 2.49 | 2.59 | 3.09 | 3.18 | 3.28 | 3.39 | 3.50 | 4.01 | 4.10 | 4.18 |
| *w s w* | 3.34 | 3.46 | 3.58 | 4.10 | 4.22 | 4.35 | 4.48 | 5.02 | | | |
| *w by s* | 4.42 | 4.56 | 5.10 | 5.24 | | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ☉ sets | 6.00 | 5:53 | 5.46 | 5.40 | 5.33 | 5.26 | 5.18 | 5.11 | 5.03 | 4.57 | 4.52 |

## *A Sun-Dial for the Latitude of 35 Degrees.*

### North Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 23 d |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | 30 |
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.26 | 0.24 | 0.23 | 0.21 | 0.19 | 0.18 | 0.16 | 0.14 | 0.13 | 0.11 | 0.10 |
| s s w | 0.53 | 0.50 | 0.47 | 0.44 | 0.40 | 0.37 | 0.33 | 0.30 | 0.26 | 0.23 | 0.20 |
| sw *by* s | 1.24 | 1.19 | 1.14 | 1.08 | 1.03 | 0.58 | 0.52 | 0.47 | 0.41 | 0.36 | 0.30 |
| s w | 1.59 | 1.52 | 1.45 | 1.38 | 1.31 | 1.23 | 1.15 | 1.08 | 0.59 | 0.53 | 0.46 |
| sw *bw* | 2.43 | 2.33 | 2.24 | 2.14 | 2.05 | 1.55 | 1.45 | 1.34 | 1.23 | 1.14 | 1.03 |
| w s w | 3.37 | 3.25 | 3.13 | 3.02 | 2.50 | 2.37 | 2.24 | 2.11 | 1.57 | 1.45 | 1.31 |
| w *by* s | 4.43 | 4.29 | 4.16 | 4.03 | 3.48 | 3.34 | 3.19 | 3.01 | 2.46 | 2.31 | 2.15 |
| West. | 6.00 | 5.46 | 5.31 | 5.17 | 5.02 | 4.46 | 4.30 | 4.13 | 3.55 | 3.39 | 3.21 |
| w *by* n | | | | | 6.21 | 6.07 | 5.52 | 5.38 | 5.19 | 5.04 | 4.47 |
| w n w | | | | | | | | | 6.44 | 6.32 | 6.17 |
| ⊙ set | 6.00 | 6.07 | 6.14 | 6.21 | 6.28 | 6.35 | 6.43 | 6.51 | 6.59 | 7.06 | 7.14 |
| Sun's | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. |
| Amp. | 0.00 | 3.03 | 6.06 | 9.10 | 12.14 | 15.18 | 18.25 | 21.32 | 24.40 | 27.12 | 29.45 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d | 23 d |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | | 30 |
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.26 | 0.28 | 0.29 | 0.31 | 0.33 | 0.34 | 0.36 | 0.38 | 0.40 | 0.41 | 0.43 |
| s s w | 0.53 | 0.57 | 1.00 | 1.04 | 1.07 | 1.10 | 1.14 | 1.17 | 1.21 | 1.24 | 1.27 |
| sw *by* s | 1.24 | 1.29 | 1.34 | 1.39 | 1.45 | 1.50 | 1.55 | 2.01 | 2.07 | 2.12 | 2.18 |
| s w | 1.59 | 2.06 | 2.14 | 2.21 | 2.28 | 2.36 | 2.43 | 2.51 | 2.59 | 3.06 | 3.14 |
| sw *by* w | 2.43 | 2.52 | 3.01 | 3.11 | 3.20 | 3.30 | 3.40 | 3.51 | 4.02 | 4.11 | 4.21 |
| w s w | 3.37 | 3.48 | 4.00 | 4.12 | 4.24 | 4.36 | 4.49 | 5.02 | | | |
| w *by* s | 4.43 | 4.57 | 5.11 | 5.24 | | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ sets | 6.00 | 5.53 | 5.46 | 5.39 | 5.32 | 5.25 | 5.17 | 5.09 | 5.01 | 4.54 | 4.46 |

## A Sun-Dial for the Latitude of 36 Degrees.

### North Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | 0.27 | 0.25 | 0.23 | 0.22 | 0.20 | 0.19 | 0.17 | 0.15 | 0.13 | 0.12 | 0.11 |
| | 0.55 | 0.51 | 0.48 | 0.45 | 0.42 | 0.38 | 0.35 | 0.31 | 0.28 | 0.24 | 0.22 |
| | 1.26 | 1.21 | 1.16 | 1.11 | 1.05 | 1.00 | 0.55 | 0.49 | 0.44 | 0.39 | 0.35 |
| | 2.02 | 1.55 | 1.48 | 1.41 | 1.34 | 1.26 | 1.19 | 1.11 | 1.04 | 0.56 | 0.51 |
| | 2.45 | 2.36 | 2.27 | 2.18 | 2.08 | 1.59 | 1.49 | 1.39 | 1.28 | 1.19 | 1.12 |
| | 3.39 | 3.28 | 3.17 | 3.05 | 2.53 | 2.41 | 2.29 | 2.16 | 2.03 | 1.51 | 1.42 |
| | 4.45 | 4.32 | 4.19 | 4.06 | 3.52 | 3.38 | 3.23 | 3.08 | 2.52 | 2.38 | 2.27 |
| | 6.00 | 5.46 | 5.32 | 5.18 | 5.04 | 4.49 | 4.33 | 4.17 | 4.00 | 3.45 | 3.33 |
| | | | | | 6.22 | 6.08 | 5.53 | 5.38 | 5.22 | 5.08 | 4.57 |
| | | | | | | | | | 6.44 | 6.33 | 6.24 |
| | 6.00 | 6.07 | 6.15 | 6.22 | 6.29 | 6.37 | 6.45 | 6.53 | 7.01 | 7.08 | 7.14 |
| | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| | 0.00 | 3.06 | 6.11 | 9.17 | 12.24 | 15.31 | 18.40 | 21.49 | 25.0 | 27.35 | 29.32 |

### South Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | 0.27 | 0.28 | 0.30 | 0.31 | 0.33 | 0.35 | 0.36 | 0.38 | 0.40 | 0.41 | 0.43 |
| | 0.55 | 0.58 | 1.01 | 1.05 | 1.08 | 1.11 | 1.15 | 1.18 | 1.22 | 1.25 | 1.27 |
| | 1.26 | 1.31 | 1.36 | 1.41 | 1.46 | 1.51 | 1.57 | 2.02 | 2.08 | 2.13 | 2.16 |
| | 2.02 | 2.09 | 2.16 | 2.23 | 2.30 | 2.27 | 2.45 | 2.53 | 3.01 | 3.07 | 3.12 |
| | 2.45 | 2.54 | 3.04 | 3.13 | 3.22 | 3.32 | 3.42 | 3.52 | 4.03 | 4.12 | 4.18 |
| | 3.39 | 3.51 | 4.02 | 4.13 | 4.25 | 4.37 | 4.49 | 5.02 | | | |
| | 4.45 | 4.58 | 5.11 | 5.25 | | | | | | | |
| | 6.00 | | | | | | | | | | |
| | 6.00 | 5.53 | 5.45 | 5.38 | 5.31 | 5.23 | 5.15 | 5.07 | 4.59 | 4.52 | 4.46 |

## *A Sun-Dial for the Latitude of* 37 *Degrees.*

### North Declination.

| Deg. Min. | o d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.27 | 0.26 | 0.24 | 0.23 | 0.21 | 0.19 | 0.18 | 0.16 | 0.14 | 0.1 |
| s s w | 0.26 | 0.53 | 0.50 | 0.46 | 0.43 | 0.40 | 0.36 | 0.33 | 0.29 | 0.26 |
| sw *b* s | 1.28 | 1.23 | 1.18 | 1.13 | 1.08 | 1.02 | 0.57 | 0.52 | 0.47 | 0.41 |
| s w | 2.04 | 1.57 | 1.50 | 1.43 | 1.36 | 1.29 | 1.22 | 1.14 | 1.07 | 1.00 |
| sw *bw* | 2.48 | 2.39 | 2.30 | 2.21 | 2.12 | 2.03 | 1.53 | 1.43 | 1.33 | 1.2 |
| w s w | 3.42 | 3.31 | 3.20 | 3.09 | 2.57 | 2.46 | 2.34 | 2.21 | 2.08 | 1.5 |
| w *by* s | 4.47 | 4.34 | 4.21 | 4.09 | 3.56 | 3.42 | 3.28 | 3.13 | 2.58 | 2.4 |
| West. | 6.00 | 5.47 | 5.33 | 5.19 | 5.06 | 4.52 | 4.37 | 4.21 | 4.05 | 3.5 |
| w *by* n | | | | | 6.22 | 6.08 | 5.54 | 5.40 | 5.24 | 5.1 |
| w n w | | | | | | | | | 6.44 | 6.3 |
| ⊙ ſet | 6.00 | 6.08 | 6.15 | 6.23 | 6.31 | 6.39 | 6.47 | 6.55 | 7.04 | 7.1 |
| Sun's Amp. | d.m. 0.00 | d.m. 3.08 | d.m. 6.16 | d.m. 9.25 | d.m. 12.33 | d.m. 16.2 | d.m. 18.85 | d.m. 22.7 | d.m. 25.22 | d.m. 27.4 |

### South Declination.

| Deg. Min. | o d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.27 | 0.29 | 0.31 | 0.32 | 0.34 | 0.35 | 0.37 | 0.39 | 0.41 | 0.4 |
| s s w | 0.56 | 0.59 | 1.02 | 1.06 | 1.09 | 1.12 | 1.16 | 1.19 | 1.23 | 1.2 |
| sw *by* s | 1.28 | 1.33 | 1.37 | 1.42 | 1.47 | 1.53 | 1.58 | 2.04 | 2.09 | 2.1 |
| s w | 2.04 | 2.11 | 2.18 | 2.25 | 2.32 | 2.39 | 2.46 | 2.54 | 3.01 | 3.0 |
| sw *by* w | 2.48 | 2.57 | 3.06 | 3.15 | 3.24 | 3.33 | 3.43 | 3.53 | 4.03 | 4.1 |
| w s w | 3.42 | 3.53 | 4.04 | 4.15 | 4.26 | 4.38 | 4.50 | 5.03 | | |
| w *by* s | 4.47 | 5.00 | 5.12 | 5.25 | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ⊙ ſets | 6.00 | 5.52 | 5.45 | 5.37 | 5.29 | 5.21 | 5.13 | 5.05 | 4.56 | 4.4 |

## *A Sun-Dial for the Latitude of 38 Degrees.*

### North Declination.

| g. n. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| int | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| uth | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| w | 0.27 | 0.26 | 0.25 | 0.23 | 0.21 | 0.20 | 0.18 | 0.17 | 0.15 | 0.13 | 0.12 |
| w | 0.59 | 0.54 | 0.51 | 0.48 | 0.45 | 0.41 | 0.38 | 0.34 | 0.31 | 0.28 | 0.26 |
| bys | 1.2 | 1.24 | 1.20 | 1.15 | 1.10 | 1.05 | 1.00 | 0.54 | 0.49 | 0.44 | 0.41 |
| w | 2.06 | 2.00 | 1.53 | 1.46 | 1.39 | 1.32 | 1.25 | 1.18 | 1.10 | 1.04 | 0.59 |
| w | 2.51 | 2.42 | 2.33 | 2.24 | 2.15 | 2.06 | 1.57 | 1.47 | 1.37 | 1.29 | 1.12 |
| w | 3.44 | 3.34 | 3.23 | 3.12 | 3.01 | 2.50 | 2.39 | 2.26 | 2.13 | 2.03 | 1.54 |
| ys | 4.48 | 4.36 | 4.24 | 4.12 | 4.01 | 3.46 | 3.33 | 3.18 | 3.03 | 2.50 | 2.40 |
| ſt. | 6.00 | 5.47 | 5.34 | 5.21 | 5.08 | 4.54 | 4.41 | 4.25 | 4.09 | 3.55 | 3.45 |
| n | | | | | 6.22 | 6.09 | 5.56 | 5.41 | 5.26 | 5.14 | 5.04 |
| w | | | | | | | | | 6.45 | 6.34 | 6.26 |
| et | 6.00 | 6.08 | 6.16 | 6.24 | 6.32 | 6.40 | 6.48 | 6.57 | 7.06 | 7.14 | 7.19 |
| 's | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| p. | 0.00 | 3.10 | 6.21 | 9.32 | 12.43 | 15.58 | 19.10 | 22.26 | 25.43 | 28.23 | 30.25 |

### South Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| n | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| w | 0.28 | 0.30 | 0.31 | 0.33 | 0.34 | 0.36 | 0.38 | 0.39 | 0.41 | 0.42 | 0.44 |
| | 0.57 | 1.00 | 1.04 | 1.07 | 1.10 | 1.13 | 1.16 | 1.20 | 1.24 | 1.27 | 1.29 |
| | 1.29 | 1.34 | 1.39 | 1.44 | 1.49 | 1.54 | 1.59 | 2.05 | 2.10 | 2.15 | 2.18 |
| | 2.06 | 2.13 | 2.20 | 2.27 | 2.34 | 2.41 | 2.48 | 2.55 | 3.03 | 3.09 | 3.14 |
| w | 2.51 | 2.59 | 3.08 | 3.17 | 3.26 | 3.35 | 3.44 | 3.54 | 4.04 | 4.13 | 4.19 |
| | 3.44 | 3.55 | 4.06 | 4.17 | 4.28 | 4.39 | 4.50 | 5.02 | | | |
| | 4.48 | 5.00 | 5.13 | 5.25 | | | | | | | |
| | 6.00 | | | | | | | | | | |
| | 6.00 | 5.52 | 5.44 | 5.36 | 5.28 | 5.20 | 5.12 | 5.03 | 4.54 | 4.46 | 4.41 |

## *A Sun-Dial for the Latitude of 39 Degrees.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.29 | 0.27 | 0.25 | 0.24 | 0.22 | 0.21 | 0.19 | 0.17 | 0.16 | 0.14 |
| s s w | 0.58 | 0.55 | 0.52 | 0.49 | 0.46 | 0.43 | 0.39 | 0.36 | 0.32 | 0.30 |
| sw *by* s | 1.31 | 1.26 | 1.22 | 1.17 | 1.12 | 1.07 | 1.02 | 0.57 | 0.51 | 0.47 |
| s w | 2.09 | 2.02 | 1.55 | 1.49 | 1.42 | 1.35 | 1.28 | 1.21 | 1.13 | 1.07 |
| sw *bw* | 2.53 | 2.45 | 2.36 | 2.27 | 2.19 | 2.10 | 2.01 | 1.51 | 1.41 | 1.33 |
| w s w | 3.47 | 3.36 | 3.26 | 3.15 | 3.05 | 2.54 | 2.42 | 2.31 | 2.18 | 2.08 |
| w *by* s | 4.50 | 4.38 | 4.26 | 4.14 | 4.02 | 3.49 | 3.36 | 3.23 | 3.08 | 2.56 |
| West. | 6.00 | 5.48 | 5.35 | 5.22 | 5.10 | 4.56 | 4.43 | 4.28 | 4.13 | 4.00 |
| w *by* n | | | | | 6.22 | 6.10 | 5.57 | 5.43 | 5.29 | 5.16 |
| w n w | | | | | | | | | 6.45 | 6.35 |
| ☉ set | 6.00 | 6.08 | 6.16 | 6.24 | 6.33 | 6.41 | 6.50 | 6.59 | 7.09 | 7.16 |
| Sun's | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. |
| Amp. | 0.00 | 3.13 | 6.26 | 9.40 | 12.55 | 16.10 | 19.27 | 22.45 | 16.7 | 28.49 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.29 | 0.30 | 0.32 | 0.33 | 0.35 | 0.36 | 0.38 | 0.40 | 0.41 | 0.43 |
| s s w | 0.58 | 1.02 | 1.05 | 1.08 | 1.11 | 1.14 | 1.18 | 1.21 | 1.25 | 1.28 |
| s w *bys* | 1.31 | 1.36 | 1.41 | 1.46 | 1.51 | 1.56 | 2.01 | 2.06 | 2.11 | 2.16 |
| s w | 2.09 | 2.15 | 2.22 | 2.29 | 2.35 | 2.42 | 2.49 | 2.57 | 3.04 | 3.12 |
| sw *byw* | 2.53 | 3.02 | 3.10 | 3.19 | 3.27 | 3.36 | 3.46 | 3.55 | 4.05 | 4.15 |
| w s w | 3.47 | 3.57 | 4.08 | 4.18 | 4.29 | 4.39 | 4.51 | 5.03 | | |
| w *by* s | 4.50 | 5.02 | 5.14 | 5.26 | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ set | 6.00 | 5.52 | 5.44 | 5.36 | 5.27 | 5.19 | 5.10 | 5.01 | 4.51 | 4.41 |

## *A Sun-Dial for the Latitude of 40 Degrees.*

### North Declination.

| eg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| oint. | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| outh | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by w | 0.29 | 0.28 | 0.26 | 0.24 | 0.23 | 0.21 | 0.20 | 0.18 | 0.17 | 0.15 | 0.14 |
| s w | 1.00 | 0.57 | 0.53 | 0.50 | 0.47 | 0.44 | 0.41 | 0.37 | 0.34 | 0.31 | 0.29 |
| by s | 1.33 | 1.28 | 1.26 | 1.19 | 1.14 | 1.09 | 1.04 | 0.59 | 0.54 | 0.49 | 0.46 |
| w | 2.11 | 2.04 | 1.58 | 1.51 | 1.45 | 1.38 | 1.31 | 1.24 | 1.17 | 1.11 | 1.06 |
| bw | 2.56 | 2.47 | 2.39 | 2.30 | 2.22 | 2.14 | 2.04 | 1.55 | 1.46 | 1.38 | 1.31 |
| s w | 3.49 | 3.39 | 3.29 | 3.18 | 3.08 | 2.58 | 2.47 | 2.35 | 2.23 | 2.13 | 2.05 |
| by s | 4.51 | 4.40 | 4.28 | 4.17 | 4.05 | 3.53 | 3.40 | 3.27 | 3.13 | 3.02 | 2.52 |
| est. | 6.00 | 5.48 | 5.36 | 5.23 | 5.11 | 4.59 | 4.46 | 4.32 | 4.17 | 4.05 | 3.55 |
| by n | | | | | 6.22 | 6.11 | 5.58 | 5.45 | 5.31 | 5.19 | 5.10 |
| n w | | | | | | | | 6.58 | 6.46 | 6.36 | 6.28 |
| ect. | 6.00 | 6.08 | 6.17 | 6.25 | 6.34 | 6.43 | 6.52 | 7.01 | 7.11 | 7.19 | 7.26 |
| ns | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| pp. | 0.00 | 3.14 | 6.32 | 9.48 | 13.6 | 16.24 | 19.45 | 23.6 | 26.31 | 29.26 | 31.22 |

### South Declination.

| g. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| n. | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| nts | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| uth | 0.29 | 0.31 | 0.32 | 0.34 | 0.35 | 0.37 | 0.38 | 0.40 | 0.42 | 0.43 | 0.44 |
| w | 1.00 | 1.03 | 1.06 | 1.09 | 1.12 | 1.15 | 1.18 | 1.22 | 1.25 | 1.28 | 1.30 |
| by s | 1.33 | 1.38 | 1.43 | 1.47 | 1.52 | 1.57 | 2.02 | 2.07 | 2.12 | 2.17 | 2.20 |
| w | 2.11 | 2.17 | 2.24 | 2.31 | 2.37 | 2.44 | 2.51 | 2.58 | 3.05 | 3.11 | 3.16 |
| bw | 2.56 | 3.04 | 3.12 | 3.21 | 3.29 | 3.38 | 3.47 | 3.56 | 4.06 | 4.14 | 4.20 |
| s w | 3.49 | 3.59 | 4.09 | 4.19 | 4.30 | 4.40 | 4.51 | | | | |
| by s | 4.51 | 5.03 | 5.14 | 5.26 | | | | | | | |
| est. | 6.00 | | | | | | | | | | |
| ects | 6.00 | 5.52 | 5.43 | 5.35 | 5.26 | 5.17 | 5.08 | 4.59 | 4.49 | 4.41 | 4.34 |

## *A Sun-Dial for the Latitude of 41 Degrees.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.30 | 0.28 | 0.27 | 0.25 | 0.24 | 0.22 | 0.21 | 0.19 | 0.17 | 0.16 |
| s s w | 1.01 | 0.58 | 0.55 | 0.52 | 0.49 | 0.46 | 0.42 | 0.39 | 0.36 | 0.33 |
| sw *by* s | 1.35 | 1.30 | 1.25 | 1.21 | 1.16 | 1.11 | 1.06 | 1.01 | 0.56 | 0.52 |
| s w | 2.13 | 2.07 | 2.00 | 1.54 | 1.48 | 1.41 | 1.34 | 1.27 | 1.20 | 1.14 |
| sw *bw* | 3.58 | 2.50 | 2.42 | 2.33 | 2.25 | 2.17 | 2.08 | 1.59 | 1.50 | 1.42 |
| w s w | 3.51 | 3.41 | 3.31 | 3.21 | 3.11 | 3.01 | 2.50 | 2.39 | 2.28 | 2.18 |
| w *by* s | 4.53 | 4.42 | 4.30 | 4.19 | 4.08 | 3.57 | 3.44 | 3.31 | 3.18 | 3.07 |
| West. | 6.00 | 5.48 | 5.36 | 5.25 | 5.13 | 5.01 | 4.48 | 4.35 | 4.21 | 4.09 |
| w *by* n | | | | | 6.23 | 6.12 | 5.59 | 5.46 | 5.33 | 5.22 |
| w n w | | | | | | | | | 6.46 | 6.37 |
| ☉ set. | 6.00 | 6.09 | 6.17 | 6.26 | 6.35 | 6.44 | 6.54 | 7.04 | 7.14 | 7.22 |
| Sun's Amp. | d.m. 0.00 | d.m. 3.18 | d.m. 6.38 | d.m. 9.57 | d.m. 13.18 | d.m. 16.40 | d.m. 20.4 | d.m. 22.29 | d.m. 26.57 | d.m. 29.1 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.39 | 0.31 | 0.33 | 0.34 | 0.36 | 0.37 | 0.39 | 0.40 | 0.42 | 0.44 |
| s s w | 1.01 | 1.04 | 1.07 | 1.10 | 1.13 | 1.16 | 1.19 | 1.23 | 1.26 | 1.29 |
| sw *by* s | 1.35 | 1.39 | 1.44 | 1.49 | 1.53 | 1.58 | 2.03 | 2.08 | 2.13 | 2.18 |
| s w | 2.13 | 2.19 | 2.26 | 2.32 | 2.39 | 2.45 | 2.52 | 2.59 | 3.06 | 3.13 |
| sw *by* w | 2.58 | 3.06 | 3.14 | 3.22 | 3.31 | 3.39 | 3.48 | 3.57 | 4.06 | 4.16 |
| w s w | 3.51 | 4.01 | 4.11 | 4.21 | 4.30 | 4.40 | 4.51 | 5.02 | | |
| w *by* s | 4.53 | 5.04 | 5.15 | 5.26 | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.51 | 5.43 | 5.34 | 3.25 | 5.16 | 5.06 | 4.56 | 4.46 | 4.36 |

## *A Sun-Dial for the Latitude of 42 Degrees.*

### North Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| W | 0.30 | 0.29 | 0.27 | 0.26 | 0.24 | 0.23 | 0.21 | 0.20 | 0.18 | 0.17 | 0.16 |
| W | 1.02 | 0.59 | 0.56 | 0.53 | 0.50 | 0.47 | 0.44 | 0.41 | 0.37 | 0.34 | 0.32 |
| SW | 1.36 | 1.32 | 1.27 | 1.23 | 1.18 | 1.14 | 1.09 | 1.04 | 0.58 | 0.54 | 0.51 |
| W | 2.15 | 2.09 | 2.03 | 1.56 | 1.50 | 1.44 | 1.37 | 1.30 | 1.23 | 1.17 | 1.13 |
| WbW | 3.00 | 2.52 | 2.44 | 2.36 | 2.28 | 2.20 | 2.12 | 2.03 | 1.54 | 1.46 | 1.40 |
| WbW | 3.53 | 3.43 | 3.34 | 3. 4 | 3.15 | 3.05 | 2.54 | 2.44 | 2.33 | 2.23 | 2.16 |
| WbS | 4.54 | 4.43 | 4.32 | 4.21 | 4.10 | 4.00 | 3.47 | 3.36 | 3.23 | 3.12 | 3.03 |
| ESE. | 6.00 | 5.49 | 5.37 | 5.26 | 5.15 | 5.03 | 4.51 | 4.39 | 4.25 | 4.13 | 4.04 |
| NW | | | | | 6.23 | 6.12 | 6.00 | 5.49 | 5.35 | 5.24 | 5.16 |
| NW | | | | | | | | 6.58 | 6.47 | 6.37 | 6.30 |
| Sets | 6.00 | 6.09 | 6.18 | 6.27 | 6.37 | 6.46 | 6.56 | 7.06 | 7.17 | 7.25 | 7.32 |
| | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| Amp. | 0.00 | 3.21 | 6.44 | 10.6 | 13.3 | 16.57 | 20.23 | 23.52 | 27.24 | 30.16 | 32.27 |

### South Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| W | 0.30 | 0.32 | 0.33 | 0.35 | 0.36 | 0.38 | 0.39 | 0.41 | 0.43 | 0.44 | 0.45 |
| W | 1.02 | 1.05 | 1.08 | 1.11 | 1.14 | 1.17 | 1.20 | 1.23 | 1.27 | 1.30 | 1.32 |
| SW | 1.36 | 1.41 | 1.46 | 1.50 | 1.55 | 1.59 | 2.04 | 2.09 | 2.14 | 2.19 | 2.22 |
| W | 2.15 | 2.21 | 2.28 | 2.34 | 2.40 | 2.46 | 2.53 | 3.00 | 3.07 | 3.13 | 3.17 |
| WbW | 3.00 | 3.08 | 3.16 | 3.24 | 3.32 | 3.40 | 3.49 | 3.57 | 4.07 | 4.14 | 4.20 |
| W | 3.53 | 4.02 | 4.12 | 4.22 | 4.31 | 4.41 | 4.52 | | | | |
| WbS | 4.45 | 5.04 | 5.15 | 5.26 | | | | | | | |
| ESE. | 6.00 | | | | | | | | | | |
| Sets | 6.00 | 5.51 | 5.42 | 5.33 | 5.23 | 5.14 | 5.04 | 0.54 | 4.43 | 4.35 | 4.28 |

## *A Sun-Dial for the Latitude of 43 Degrees.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.31 | 0.29 | 0.28 | 0.27 | 0.25 | 0.24 | 0.22 | 0.21 | 0.19 | 0.18 |
| s s w | 1.03 | 1.00 | 0.57 | 0.54 | 0.51 | 0.48 | 0.45 | 0.42 | 0.39 | 0.36 |
| s w *by* s | 1.38 | 1.34 | 1.29 | 1.24 | 1.20 | 1.15 | 1.11 | 1.06 | 1.01 | 0.57 |
| s w | 2.17 | 2.11 | 2.05 | 1.59 | 1.53 | 1.47 | 1.40 | 1.33 | 1.26 | 1.20 |
| s w *by* w | 3.02 | 2.55 | 2.47 | 2.39 | 2.31 | 2.23 | 2.15 | 2.07 | 1.58 | 1.50 |
| w s w | 3.55 | 3.46 | 3.36 | 3.27 | 3.18 | 3.08 | 2.58 | 2.48 | 2.37 | 2.28 |
| w *by* s | 4.55 | 4.45 | 4.34 | 4.23 | 4.13 | 4.03 | 3.51 | 3.40 | 3.27 | 3.17 |
| West. | 6.00 | 4.49 | 5.38 | 5.27 | 5.16 | 5.05 | 4.53 | 4.41 | 4.27 | 4.17 |
| w *by* n | | | | | 6.23 | 6.13 | 6.01 | 5.50 | 5.37 | 5.27 |
| w n w | | | | | | | | 6.58 | 6.47 | 6.38 |
| ☉ sets | 6.00 | 6.09 | 6.19 | 6.28 | 6.38 | 6.48 | 6.58 | 7.09 | 7.19 | 7.28 |
| Sun's Amp. | d. m. 0.00 | d. m. 3.25 | d. m. 6.51 | d. m. 10.17 | d. m. 3.44 | d. m. 17.12 | d. m. 20.43 | d. m. 24.16 | d. m. 27.53 | d. m. 30.4 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.31 | 0.32 | 0.34 | 0.35 | 0.37 | 0.38 | 0.40 | 0.41 | 0.43 | 0.44 |
| s s w | 1.03 | 1.06 | 1.09 | 1.12 | 1.15 | 1.18 | 1.21 | 1.24 | 1.27 | 1.30 |
| s w *by* s | 1.38 | 1.42 | 1.47 | 1.52 | 1.56 | 2.01 | 2.05 | 2.10 | 2.15 | 2.19 |
| s w | 2.17 | 2.23 | 2.29 | 2.36 | 2.42 | 2.48 | 2.54 | 3.01 | 3.08 | 3.14 |
| s w *by* w | 3.02 | 3.10 | 3.18 | 3.26 | 3.33 | 3.41 | 3.50 | 3.58 | 4.07 | 4.14 |
| w s w | 3.55 | 4.04 | 4.14 | 4.23 | 4.32 | 4.42 | 4.52 | | | |
| w *by* s | 4.55 | 5.05 | 5.16 | 5.27 | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.51 | 5.41 | 5.32 | 5.22 | 5.12 | 5.02 | 4.51 | 4.41 | 4.31 |

## A Sun-Dial for the Latitude of 44 Degrees.

### North Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | 0.31 | 0.30 | 0.29 | 0.27 | 0.26 | 0.24 | 0.23 | 0.21 | 0.20 | 0.18 | 0.17 |
| | 1.04 | 1.01 | 0.58 | 0.56 | 0.53 | 0.50 | 0.47 | 0.44 | 0.40 | 0.38 | 0.36 |
| | 1.40 | 1.35 | 1.31 | 1.27 | 1.22 | 1.18 | 1.13 | 1.08 | 1.03 | 0.59 | 0.56 |
| W | 2.19 | 2.13 | 2.07 | 2.01 | 1.55 | 1.49 | 1.43 | 1.36 | 1.29 | 1.24 | 1.20 |
| | 3.04 | 2.57 | 2.49 | 2.42 | 2.34 | 2.26 | 2.18 | 2.10 | 2.01 | 1.54 | 1.49 |
| | 3.57 | 3.48 | 3.38 | 3.29 | 3.21 | 3.12 | 3.02 | 2.52 | 2.41 | 2.33 | 2.26 |
| | 4.56 | 4.46 | 4.36 | 4.25 | 4.16 | 4.05 | 3.54 | 3.43 | 3.31 | 3.21 | 3.13 |
| | 6.00 | 5.50 | 5.39 | 5.28 | 5.18 | 5.07 | 4.56 | 4.44 | 4.31 | 4.21 | 4.13 |
| | | | | | 6.23 | 6.13 | 6.02 | 5.51 | 5.39 | 5.29 | 5.21 |
| | | | | | | | | 6.59 | 6.48 | 6.39 | 6.31 |
| | 6.00 | 6.10 | 6.19 | 6.29 | 6.39 | 6.49 | 7.00 | 7.11 | 7.22 | 7.31 | 7.39 |
| | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. |
| | 0.00 | 3.28 | 6.58 | 10.27 | 13.58 | 17.20 | 21.5 | 24.42 | 28.23 | 31.23 | 33.41 |

### South Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | 0.31 | 0.33 | 0.34 | 0.36 | 0.37 | 0.39 | 0.40 | 0.42 | 0.43 | 0.45 | 0.46 |
| | 1.04 | 1.07 | 1.10 | 1.13 | 1.16 | 1.19 | 1.22 | 1.25 | 1.28 | 1.31 | 1.33 |
| | 1.40 | 1.44 | 1.48 | 1.53 | 1.57 | 2.02 | 2.06 | 2.11 | 2.16 | 2.20 | 2.23 |
| W | 2.19 | 2.25 | 2.31 | 2.37 | 2.43 | 2.49 | 2.56 | 3.02 | 3.09 | 3.14 | 3.19 |
| | 3.04 | 3.12 | 3.19 | 3.27 | 3.35 | 3.42 | 3.51 | 3.59 | 4.08 | 4.15 | 4.20 |
| | 3.57 | 4.06 | 4.15 | 4.24 | 4.33 | 4.42 | 4.52 | | | | |
| | 4.56 | 5.06 | 5.16 | 5.27 | | | | | | | |
| | 6.00 | | | | | | | | | | |
| | 6.00 | 5.50 | 5.41 | 5.31 | 5.21 | 5.11 | 5.00 | 4.49 | 4.38 | 4.29 | 2.21 |

## *A Sun-Dial for the Latitude of 45 Degrees.*

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.32 | 0.31 | 0.29 | 0.28 | 0.26 | 0.25 | 0.24 | 0.22 | 0.20 | 0.1 |
| s s w | 1.05 | 1.03 | 1.00 | 0.57 | 0.54 | 0.51 | 0.48 | 0.45 | 0.42 | 0.3 |
| s w *by* s | 1.41 | 1.37 | 1.33 | 1.28 | 1.24 | 1.19 | 1.15 | 1.10 | 1.05 | 1.0 |
| s w | 2.21 | 2.15 | 2.09 | 2.03 | 1.58 | 1.52 | 1.45 | 1.39 | 1.33 | 1.2 |
| sw *by* w | 3.06 | 2.59 | 2.52 | 2.45 | 2.37 | 2.29 | 2.22 | 2.13 | 2.05 | 1.5 |
| w s w | 3.59 | 3.50 | 3.41 | 3.32 | 3.23 | 3.14 | 3.05 | 2.55 | 2.45 | 2.3 |
| w *by* s | 4.57 | 4.47 | 4.38 | 4.28 | 4.18 | 4.08 | 3.57 | 3.46 | 3.35 | 3.2 |
| West. | 6.00 | 5.50 | 5.40 | 5.30 | 5.19 | 5.09 | 4.58 | 4.46 | 4.35 | 4.2 |
| w *by* n | | | | | 6.24 | 6.14 | 6.03 | 5.52 | 5.41 | 5.3 |
| w n w | | | | | | | | 6.58 | 6.48 | 6.4 |
| nw *b* w | | | | | | | | | | |
| ☉ sets | 6.00 | 6.10 | 6.20 | 6.30 | 6.41 | 6.51 | 7.02 | 7.13 | 7.25 | 7.3 |
| Sun's Amp. | d.m. 0.00 | d. m 3.32 | d. m 7.05 | d. m 10.38 | d.m. 14.13 | d.m. 17.49 | d.m. 21.28 | d.m. 25.5 | d.m. 28.56 | d. m 32.0 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.32 | 0.33 | 0.35 | 0.36 | 0.38 | 0.39 | 0.41 | 0.42 | 0.44 | 0.4 |
| s s w | 1.05 | 1.08 | 1.11 | 1.14 | 1.17 | 1.20 | 1.23 | 1.26 | 1.29 | 1.3 |
| sw *by* s | 1.41 | 1.45 | 1.50 | 1.54 | 1.58 | 2.03 | 2.07 | 2.12 | 2.17 | 2.21 |
| s w | 2.21 | 2.27 | 2.33 | 2.39 | 2.44 | 2.51 | 2.57 | 3.03 | 3.10 | 3.15 |
| sw *by* w | 3.06 | 3.14 | 3.21 | 3.28 | 3.36 | 3.44 | 3.51 | 4.00 | 4.08 | 4.15 |
| w s w | 3.59 | 4.07 | 4.16 | 4.25 | 4.34 | 4.43 | 4.52 | | | |
| w *by* s | 4.57 | 5.07 | 5.17 | 5.26 | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.50 | 5.40 | 5.30 | 5.19 | 5.09 | 4.58 | 4.47 | 4.35 | 4.25 |

## A Sun Dial for the Latitude of 46 Degrees.

### North Declination.

| ○ | d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| h | m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | | 0.33 | 0.31 | 0.30 | 0.29 | 0.27 | 0.26 | 0.24 | 0.23 | 0.21 | 0.20 | 0.19 |
| | | 1.06 | 1.04 | 1.01 | 0.58 | 0.55 | 0.52 | 0.49 | 0.46 | 0.43 | 0.41 | 0.39 |
| | | 1.43 | 1.38 | 1.34 | 1.30 | 1.26 | 1.21 | 1.17 | 1.12 | 1.08 | 1.04 | 1.01 |
| | | 2.23 | 2.17 | 2.11 | 2.06 | 2.00 | 1.54 | 1.48 | 1.42 | 1.36 | 1.30 | 1.26 |
| | | 3.08 | 3.01 | 2.54 | 2.47 | 2.40 | 2.32 | 2.25 | 2.17 | 2.09 | 2.02 | 1.57 |
| | | 4.00 | 3.52 | 3.43 | 3.35 | 3.26 | 3.17 | 3.08 | 2.59 | 2.49 | 2.41 | 2.35 |
| | | 4.58 | 4.49 | 4.39 | 4.30 | 4.20 | 4.11 | 4.00 | 3.50 | 3.39 | 3.30 | 3.23 |
| | | 6.00 | 5.50 | 5.40 | 5.30 | 5.20 | 5.11 | 5.00 | 4.49 | 4.38 | 4.28 | 4.21 |
| | | | | | | 6.24 | 6.14 | 6.04 | 5.54 | 5.43 | 5.33 | 5.26 |
| | | | | | | | | | 6.59 | 6.49 | 6.41 | 6.34 |
| | | | | | | | | | | | | 7.40 |
| | | 6.00 | 6.10 | 6.21 | 6.31 | 6.42 | 6.53 | 7.04 | 7.16 | 7.29 | 7.39 | 7.47 |
| | | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| | | 0.00 | 3.36 | 7.11 | 10.51 | 14.27 | 18.9 | 21.53 | 25.39 | 29.30 | 32.37 | 35.2 |

### South Declination.

| ○ | d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| h | m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | | 0.33 | 0.34 | 0.35 | 0.37 | 0.38 | 0.40 | 0.41 | 0.42 | 0.44 | 0.45 | 0.46 |
| | | 1.06 | 1.09 | 1.12 | 1.15 | 1.18 | 1.20 | 1.23 | 1.26 | 1.29 | 1.32 | 1.34 |
| | | 1.43 | 1.47 | 1.51 | 1.55 | 2.00 | 2.04 | 2.08 | 2.13 | 2.18 | 2.22 | 2.25 |
| | | 2.23 | 2.29 | 2.34 | 2.40 | 2.46 | 2.52 | 2.58 | 3.04 | 3.10 | 3.16 | 3.20 |
| | | 3.08 | 3.16 | 3.23 | 3.30 | 3.37 | 3.45 | 3.52 | 4.00 | 4.08 | 4.15 | |
| | | 4.00 | 4.09 | 4.17 | 4.26 | 4.34 | 4.43 | | | | | |
| | | 4.58 | 5.08 | 5.17 | 5.26 | | | | | | | |
| | | 6.00 | | | | | | | | | | |
| | | 6.00 | 5.50 | 5.39 | 5.29 | 5.18 | 5.07 | 4.56 | 4.44 | 4.31 | 4.21 | 4.13 |

## *A Sun-Dial for the Latitude of 47 Degrees.*

### North Declination.

| Deg. Min. | o d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.33 | 0.32 | 0.30 | 0.29 | 0.28 | 0.26 | 0.25 | 0.23 | 0.22 | 0.21 |
| s s w | 1.07 | 1.05 | 1.02 | 0.59 | 0.56 | 0.54 | 0.51 | 0.48 | 0.45 | 0.43 |
| s w *by* s | 1.44 | 1.34 | 1.36 | 1.32 | 1.28 | 1.23 | 1.19 | 1.15 | 1.10 | 1.05 |
| s w | 2.25 | 2.19 | 2.14 | 2.08 | 2.02 | 1.57 | 1.51 | 1.45 | 1.39 | 1.33 |
| s w *by* w | 3.10 | 3.03 | 2.56 | 2.49 | 2.42 | 2.35 | 2.28 | 2.20 | 2.14 | 2.07 |
| w s w | 4.02 | 3.54 | 3.46 | 3.57 | 3.29 | 3.20 | 3.12 | 3.03 | 2.53 | 2.43 |
| w *by* s | 4.59 | 4.50 | 4.41 | 4.32 | 4.23 | 4.13 | 4.03 | 3.53 | 3.43 | 3.33 |
| West. | 6.00 | 5.51 | 5.41 | 5.32 | 5.22 | 5.12 | 5.03 | 4.52 | 4.41 | 4.31 |
| w *by* n | | | | 6.34 | 6.25 | 6.15 | 6.05 | 5.55 | 5.44 | 5.34 |
| w n w | | | | | | | 7.08 | 6.59 | 6.49 | 6.40 |
| nw *bw* | | | | | | | | | | |
| ⊙ set | 6.00 | 6.11 | 6.22 | 6.33 | 6.44 | 6.55 | 7.07 | 7.20 | 7.32 | 7.45 |
| Sun's Amp. | d.m. 0.00 | d.m. 3.40 | d.m. 7.21 | d.m. 11.2 | d.m. 14.45 | d.m. 18.30 | d.m. 22.18 | d.m. 26.10 | d.m. 30.7 | d.m. 33.1 |

### South Declination.

| Deg. Min. | o d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.33 | 0.34 | 0.36 | 0.37 | 0.38 | 0.48 | 0.41 | 0.43 | 0.44 | 0.45 |
| s s w | 1.07 | 1.10 | 1.13 | 1.16 | 1.18 | 1.21 | 1.24 | 1.27 | 1.30 | 1.33 |
| s w *by* s | 1.44 | 1.48 | 1.52 | 1.57 | 2.01 | 2.05 | 2.09 | 2.14 | 2.18 | 2.23 |
| s w | 2.25 | 2.30 | 2.36 | 2.41 | 2.47 | 2.53 | 2.59 | 3.05 | 3.11 | 3.18 |
| s w *by* w | 3.10 | 3.17 | 3.24 | 3.31 | 3.38 | 3.45 | 3.53 | 4.00 | 4.07 | 4.15 |
| w s w | 4.02 | 4.10 | 4.18 | 4.26 | 4.35 | 4.43 | | | | |
| w *by* s | 4.59 | 5.08 | 5.17 | | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ⊙ sets | 6.00 | 5.49 | 5.38 | 5.27 | 5.16 | 5.05 | 4.53 | 4.40 | 4.28 | 4.17 |

## A Sun-Dial for the Latitude of 48 Degrees.

### North Declination.

| ° | d | 2 | d | 5 | d | 7 | d | 10 | d | 12 | d | 15 | d | 17 | d | 20 | d | 22 | d | 23 | d |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30m | | | | 30m | | | | 30m | | | | 30m | | | | | | 30m | |
| h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m |
| | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | |
| | | 0.34 | | 0.32 | | 0.31 | | 0.30 | | 0.28 | | 0.27 | | 0.26 | | 0.24 | | 0.23 | | 0.22 | |
| | | 1.08 | | 1.06 | | 1.03 | | 1.00 | | 0.58 | | 0.55 | | 0.52 | | 0.49 | | 0.46 | | 0.44 | |
| | | 1.46 | | 1.42 | | 1.38 | | 1.34 | | 1.30 | | 1.25 | | 1.21 | | 1.17 | | 1.12 | | 1.08 | |
| | | 2.26 | | 2.21 | | 2.16 | | 2.10 | | 2.05 | | 1.59 | | 1.53 | | 1.47 | | 1.41 | | 1.36 | |
| | | 3.12 | | 3.05 | | 2.59 | | 2.52 | | 2.45 | | 2.39 | | 2.31 | | 2.23 | | 2.16 | | 2.09 | |
| | | 4.03 | | 3.56 | | 3.48 | | 3.40 | | 3.32 | | 3.23 | | 3.15 | | 3.06 | | 2.57 | | 2.49 | |
| | | 5.00 | | 4.51 | | 4.43 | | 4.34 | | 4.25 | | 4.16 | | 4.06 | | 3.56 | | 3.46 | | 3.38 | |
| | | 6.00 | | 5.51 | | 5.42 | | 5.33 | | 5.23 | | 5.14 | | 5.04 | | 4.54 | | 4.43 | | 4.35 | |
| | | | | | | | | | | 6.25 | | 5.16 | | 5.06 | | 5.56 | | 5.46 | | 5.38 | |
| | | | | | | | | | | | | | | 7.08 | | 6.58 | | 6.50 | | 6.42 | |
| | | | | | | | | | | | | | | | | | | | | 7.45 | |
| | | 6.00 | | 6.11 | | 6.22 | | 6.33 | | 6.45 | | 6.57 | | 7.09 | | 7.22 | | 7.35 | | 7.47 | |
| | | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. | d. | m. |
| | | 0. | 00 | 3. | 49 | 7. | 29 | 11. | 15 | 15. | 21 | 18. | 52 | 22. | 45 | 25. | 43 | 30. | 49 | 34. | 33 |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | 36. | 34 |

### South Declination.

| ° | d | 2 | d | 5 | d | 7 | d | 10 | d | 12 | d | 15 | d | 17 | d | 20 | d | 22 | d | 23 | d |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30m | | | | 30m | | | | 30m | | | | 30m | | | | | | 30m | |
| h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m | h | m |
| | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | | 12 | |
| | | 0.34 | | 0.35 | | 0.36 | | 0.38 | | 0.39 | | 0.40 | | 0.42 | | 0.43 | | 0.45 | | 0.47 | |
| | | 1.08 | | 1.11 | | 1.14 | | 1.16 | | 1.19 | | 1.22 | | 1.25 | | 1.28 | | 1.31 | | 1.33 | |
| | | 1.46 | | 1.50 | | 1.54 | | 1.58 | | 2.02 | | 2.06 | | 2.10 | | 2.15 | | 2.19 | | 2.23 | |
| | | 2.26 | | 2.32 | | 2.37 | | 2.43 | | 2.48 | | 2.54 | | 3.00 | | 3.05 | | 3.12 | | 3.17 | |
| | | 3.12 | | 3.19 | | 3.26 | | 3.32 | | 3.39 | | 3.45 | | 3.53 | | 4.01 | | 4.09 | | | |
| | | 4.03 | | 4.11 | | 4.19 | | 4.27 | | 4.35 | | 4.44 | | | | | | | | | |
| | | 5.00 | | 5.09 | | 5.17 | | 5.26 | | | | | | | | | | | | | |
| | | 6.00 | | | | | | | | | | | | | | | | | | | |
| | | 6.00 | | 5.54 | | 5.49 | | 5.27 | | 5.15 | | 5.02 | | 4.51 | | 4.38 | | 4.25 | | 4.13 | |

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | 4. | 04 |

## A Sun-Dial for the Latitude of 49 Degrees.

### North Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | |
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.34 | 0.33 | 0.32 | 0.30 | 0.29 | 0.28 | 0.26 | 0.25 | 0.23 | 0.2 |
| s s w | 1.09 | 1.07 | 1.04 | 1.02 | 0.59 | 0.56 | 0.53 | 0.51 | 0.48 | 0.4 |
| sw *by* s | 1.47 | 1.43 | 1.39 | 1.35 | 1.31 | 1.27 | 1.23 | 1.19 | 1.14 | 1.1 |
| s w | 2.28 | 2.23 | 2.18 | 2.12 | 2.07 | 2.01 | 1.56 | 1.50 | 1.44 | 1.3 |
| sw *bw* | 3.14 | 3.07 | 3.01 | 2.54 | 2.48 | 2.41 | 2.34 | 2.27 | 2.19 | 2.1 |
| w s w | 4.05 | 3.57 | 3.50 | 3.42 | 3.34 | 3.26 | 3.18 | 3.09 | 3.00 | 2.5 |
| w *by* s | 5.01 | 4.53 | 4.44 | 4.36 | 4.27 | 4.18 | 4.09 | 4.00 | 3.50 | 3.4 |
| West. | 6.00 | 5.51 | 5.42 | 5.34 | 5.25 | 5.16 | 5.06 | 4.56 | 4.46 | 4.3 |
| w *by* n | | | | 6.34 | 6.25 | 6.16 | 6.07 | 5.58 | 5.48 | 5.4 |
| w n w | | | | | | | 7.08 | 7.00 | 6.51 | 6.4 |
| nw *bw* | | | | | | | | | | 7.4 |
| ☉ set. | 6.00 | 6.11 | 6.23 | 6.35 | 6.47 | 6.59 | 7.12 | 7.25 | 7.39 | 7.5 |
| Sun's | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m |
| Amp. | 0.00 | 3.48 | 7.38 | 11.28 | 15.21 | 19.15 | 23.14 | 27. 7 | 31.25 | 34.4 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | |
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.34 | 0.35 | 0.37 | 0.38 | 0.39 | 0.41 | 0.42 | 0.43 | 0.45 | 0.4 |
| s s w | 1.09 | 1.12 | 1.15 | 1.17 | 1.20 | 1.23 | 1.25 | 1.28 | 1.31 | 1.3 |
| sw *by* s | 1.47 | 1.51 | 1.55 | 1.59 | 2.03 | 2.07 | 2.11 | 2.15 | 2.20 | 2.2 |
| s w | 2.28 | 2.33 | 2.39 | 2.44 | 2.49 | 2.55 | 3.00 | 3.06 | 3.12 | 3.1 |
| sw *by* w | 3.14 | 3.20 | 3.27 | 3.34 | 3.40 | 3.47 | 3.54 | 4.01 | 4.09 | |
| w s w | 4.05 | 4.13 | 4.20 | 4.28 | 4.36 | 4.44 | | | | |
| w *by* s | 5.01 | 5.09 | 5.18 | | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.49 | 5.37 | 5.25 | 5.13 | 5.01 | 4.48 | 4.35 | 4.21 | 4.09 |

## *A Sun-Dial for the Latitude of 50 Degrees.*

### North Declination.

| ○ | d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| h m | | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| 12 | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 0.35 | | 0.33 | 0.32 | 0.31 | 0.30 | 0.28 | 0.27 | 0.26 | 0.24 | 0.23 | 0.22 |
| 1.10 | | 1.08 | 1.05 | 1.03 | 1.00 | 0.58 | 0.55 | 0.52 | 0.49 | 0.47 | 0.45 |
| 1.48 | | 1.45 | 1.41 | 1.37 | 1.33 | 1.29 | 1.25 | 1.21 | 1.16 | 1.13 | 1.10 |
| 2.30 | | 2.25 | 2.20 | 2.15 | 2.09 | 2.04 | 1.58 | 1.53 | 1.47 | 1.42 | 1.38 |
| 3.16 | | 3.09 | 3.03 | 2.56 | 2.50 | 2.43 | 2.36 | 2.30 | 2.23 | 2.16 | 2.12 |
| 4.06 | | 3.59 | 3.51 | 3.44 | 3.36 | 3.29 | 3.21 | 3.13 | 3.04 | 2.57 | 2.51 |
| 5.02 | | 4.54 | 4.45 | 4.37 | 4.29 | 4.20 | 4.12 | 4.03 | 3.53 | 3.45 | 3.39 |
| 6.00 | | 5.52 | 5.43 | 5.34 | 5.26 | 5.17 | 5.08 | 4.59 | 4.49 | 4.41 | 4.34 |
| | | | | 6.34 | 6.25 | 6.17 | 6.08 | 5.59 | 5.49 | 5.42 | 5.36 |
| | | | | | | | 7.08 | 7.00 | 6.51 | 6.44 | 6.39 |
| | | | | | | | | | | 7.45 | 7.41 |
| 6.00 | | 6.12 | 6.24 | 6.36 | 6.49 | 7.01 | 7.14 | 7.28 | 7.43 | 7.55 | 8.05 |
| d. m. | | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. |
| 0.00 | | 3.53 | 7.48 | 11.43 | 15.40 | 19.40 | 23.44 | 27.53 | 32.9 | 35.40 | 38.20 |

### South Declination.

| ○ | d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| h m | | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| 12 | | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 0.35 | | 0.36 | 0.37 | 0.38 | 0.40 | 0.41 | 0.42 | 6.44 | 0.45 | 0.46 | 0.47 |
| 1.10 | | 1.13 | 1.15 | 1.18 | 1.21 | 1.23 | 1.26 | 1.29 | 1.32 | 1.34 | 1.36 |
| 1.48 | | 1.52 | 1.56 | 2.00 | 2.04 | 2.08 | 2.12 | 2.16 | 2.20 | 2.24 | 2.27 |
| 2.30 | | 2.35 | 2.40 | 2.45 | 2.50 | 2.56 | 3.01 | 3.07 | 3.13 | 3.17 | 3.21 |
| 3.16 | | 3.22 | 3.28 | 3.35 | 3.41 | 3.48 | 3.55 | 4.02 | 4.09 | | |
| 4.06 | | 4.14 | 4.21 | 4.29 | 4.36 | 4.44 | | | | | |
| 5.02 | | 5.10 | 5.18 | | | | | | | | |
| 6.00 | | | | | | | | | | | |
| 6.00 | | 5.48 | 5.36 | 5.24 | 5.11 | 4.59 | 4.46 | 4.32 | 4.17 | 4.05 | 3.55 |

## A Sun-Dial for the Latitude of 51 Degrees.

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s by w | 0.35 | 0.34 | 0.33 | 0.31 | 0.30 | 0.29 | 0.28 | 0.26 | 0.25 | 0.24 |
| s s w | 1.11 | 1.09 | 1.06 | 1.04 | 1.01 | 0.59 | 0.56 | 0.53 | 0.51 | 0.48 |
| sw by s | 1.50 | 1.46 | 1.42 | 1.39 | 1.35 | 1.31 | 1.27 | 1.23 | 1.19 | 1.15 |
| s w | 2.31 | 2.26 | 2.21 | 2.16 | 2.11 | 2.06 | 2.01 | 1.55 | 1.50 | 1.45 |
| sw bw | 3.17 | 3.11 | 3.05 | 2.59 | 2.52 | 2.46 | 2.39 | 2.33 | 2.26 | 2.20 |
| w s w | 4.08 | 4.01 | 3.53 | 3.46 | 3.39 | 3.31 | 3.24 | 3.16 | 3.07 | 3.01 |
| w by s | 5.03 | 4.55 | 4.47 | 4.39 | 4.31 | 4.22 | 4.14 | 4.05 | 3.56 | 3.49 |
| West. | 6.00 | 5.52 | 5.44 | 5.35 | 5.27 | 5.18 | 5.10 | 5.01 | 4.51 | 4.44 |
| w by n | | | | 6.34 | 6.26 | 6.17 | 6.09 | 6.00 | 5.51 | 5.44 |
| w n w | | | | | | | 7.08 | 7.00 | 6.52 | 6.45 |
| nw bw | | | | | | | | | | 7.45 |
| ☉ set | 6.00 | 6.13 | 6.25 | 6.38 | 6.50 | 7.03 | 7.17 | 7.32 | 7.47 | 8.00 |
| Sun's Amp. | d. m. 0.00 | d. m. 3.58 | d. m. 7.58 | d. m. 11.58 | d. m. 16.1 | d. m. 20.8 | d. m. 24.27 | d. m. 28.33 | d. m. 32.55 | d. m. 36.32 |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s by w | 0.35 | 0.36 | 0.38 | 0.39 | 0.40 | 0.41 | 0.43 | 0.44 | 0.46 | 0.47 |
| s s w | 1.11 | 1.14 | 1.16 | 1.19 | 1.21 | 1.24 | 1.27 | 1.29 | 1.32 | 1.34 |
| sw by s | 1.50 | 1.53 | 1.57 | 2.01 | 2.05 | 2.09 | 2.13 | 2.17 | 2.21 | 2.24 |
| s w | 2.31 | 2.36 | 2.41 | 2.46 | 2.52 | 2.57 | 3.02 | 3.07 | 3.13 | 3.18 |
| sw by w | 3.17 | 3.23 | 3.30 | 3.36 | 3.42 | 3.49 | 3.55 | 4.02 | 4.09 | |
| w s w | 4.08 | 4.15 | 4.22 | 4.29 | 4.37 | 4.44 | | | | |
| w by s | 5.03 | 5.10 | 5.18 | | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.47 | 5.35 | 5.22 | 5.10 | 4.57 | 4.43 | 4.28 | 4.13 | 4.00 |

## A Sun-Dial for the Latitude of 52 Degrees.

### North Declination.

| 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|
| h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 0.36 | 0.34 | 0.33 | 0.32 | 0.31 | 0.30 | 0.28 | 0.27 | 0.26 | 0.27 | 0.24 |
| 1.12 | 1.10 | 1.08 | 1.05 | 1.03 | 1.00 | 0.57 | 0.55 | 0.52 | 0.50 | 0.48 |
| 1.51 | 1.47 | 1.44 | 1.40 | 1.36 | 1.33 | 1.29 | 1.25 | 1.21 | 1.17 | 1.15 |
| 2.33 | 2.28 | 2.23 | 2.18 | 2.13 | 2.08 | 2.03 | 1.58 | 1.52 | 1.48 | 1.44 |
| 3.19 | 3.13 | 3.07 | 3.01 | 2.55 | 2.48 | 2.42 | 2.36 | 2.29 | 2.24 | 2.19 |
| 4.09 | 4.02 | 3.55 | 3.48 | 3.41 | 3.34 | 3.26 | 3.19 | 3.11 | 3.04 | 2.59 |
| 5.03 | 4.56 | 4.48 | 4.40 | 4.33 | 4.25 | 4.16 | 4.08 | 3.59 | 3.52 | 3.46 |
| 6.00 | 5.52 | 5.44 | 5.36 | 5.28 | 5.20 | 5.12 | 5.03 | 4.54 | 4.46 | 4.40 |
| | | | 6.33 | 6.26 | 6.18 | 6.10 | 6.01 | 5.53 | 5.45 | 5.40 |
| | | | | | | 7.08 | 7.00 | 6.53 | 6.46 | 6.41 |
| | | | | | | | | | 7.45 | 7.40 |
| 6.00 | 6.13 | 6.26 | 6.39 | 6.52 | 7.06 | 6.20 | 7.35 | 7.51 | 8.05 | 8.16 |
| d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| 0.00 | 4.03 | 8.08 | 12.14 | 16.23 | 20.40 | 24.5 | 29.14 | 33.46 | 37.29 | 40.21 |

### South Declination.

| 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|
| h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 0.36 | 0.37 | 0.38 | 0.39 | 0.41 | 0.42 | 0.43 | 0.44 | 0.46 | 0.47 | 0.48 |
| 1.12 | 1.15 | 1.17 | 1.20 | 1.22 | 1.25 | 1.27 | 1.30 | 1.33 | 1.35 | 1.37 |
| 1.51 | 1.55 | 1.58 | 2.02 | 2.06 | 2.10 | 2.13 | 2.17 | 2.22 | 2.25 | 2.28 |
| 2.33 | 2.38 | 2.43 | 2.48 | 2.53 | 2.58 | 3.03 | 3.08 | 3.13 | 3.18 | 3.22 |
| 3.19 | 3.25 | 3.31 | 3.37 | 3.43 | 3.49 | 3.56 | 4.02 | 4.10 | | |
| 4.09 | 4.16 | 4.23 | 4.30 | 4.37 | 4.44 | | | | | |
| 5.03 | 5.11 | 5.19 | | | | | | | | |
| 6.00 | | | | | | | | | | |
| 6.00 | 5.47 | 5.34 | 5.21 | 5.08 | 4.54 | 4.40 | 4.25 | 4.09 | 3.55 | 3.44 |

## *A Sun-Dial for the Latitude of* 53 *Degrees.*

### North Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | |
| Point | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.36 | 0.35 | 0.34 | 0.33 | 0.31 | 0.30 | 0.29 | 0.28 | 0.26 | 0.25 |
| s s w | 1.13 | 1.11 | 1.08 | 1.06 | 1.04 | 1.01 | 0.59 | 0.56 | 0.53 | 0.51 |
| sw *by* s | 1.52 | 1.49 | 1.45 | 1.41 | 1.38 | 1.34 | 1.31 | 1.27 | 1.23 | 1.19 |
| s w | 2.34 | 2.30 | 2.25 | 2.20 | 2.15 | 2.10 | 2.05 | 2.00 | 1.55 | 1.51 |
| sw *bw* | 3.20 | 3.15 | 3.09 | 3.03 | 2.57 | 2.51 | 2.45 | 2.38 | 2.32 | 2.26 |
| w s w | 4.10 | 4.04 | 3.57 | 3.50 | 3.43 | 3.36 | 3.29 | 3.22 | 3.14 | 3.06 |
| w *by* s | 5.04 | 4.57 | 4.49 | 4.42 | 4.34 | 4.27 | 4.19 | 4.11 | 4.02 | 3.53 |
| West. | 6.00 | 5.52 | 5.45 | 5.37 | 5.29 | 5.22 | 5.15 | 5.05 | 4.56 | 4.48 |
| w *by* n | | | | 6.34 | 6.26 | 6.19 | 6.11 | 6.03 | 5.54 | 5.47 |
| w n w | | | | | | | 7.08 | 7.01 | 6.53 | 6.47 |
| nw *bw* | | | | | | | | | 7.51 | 7.45 |
| ⊙ set | 6.00 | 6.14 | 6.27 | 6.41 | 6.54 | 7.08 | 7.23 | 7.39 | 7.56 | 8.16 |
| Sun's | d.m | d.m | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m |
| Amp. | 0.00 | 4.09 | 8.19 | 12.31 | 16.46 | 21.5 | 25.28 | 29.59 | 34.39 | 38.5 |

### South Declination.

| Deg. | 0 d | 2 d | 5 d | 7 d | 10 d | 12 d | 15 d | 17 d | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Min. | | 30m | | 30m | | 30m | | 30m | | |
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s *by* w | 0.36 | 0.37 | 0.38 | 0.40 | 0.41 | 0.42 | 0.43 | 0.45 | 0.46 | 0.47 |
| s s w | 1.13 | 1.16 | 1.18 | 1.20 | 1.23 | 1.25 | 1.28 | 1.30 | 1.33 | 1.35 |
| sw *by* s | 1.52 | 1.56 | 2.00 | 2.03 | 2.07 | 2.10 | 2.14 | 2.18 | 2.22 | 2.26 |
| s w | 2.34 | 2.39 | 2.44 | 2.49 | 2.54 | 2.58 | 3.03 | 3.09 | 3.14 | 3.19 |
| sw *by* w | 3.20 | 3.26 | 3.32 | 3.38 | 3.44 | 3.50 | 3.56 | 4.02 | | |
| w s w | 4.10 | 4.17 | 4.24 | 4.30 | 4.37 | 4.44 | | | | |
| w *by* s | 5.04 | 5.11 | 5.19 | | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ⊙ set | 6.00 | 5.46 | 5.33 | 5.19 | 5.06 | 4.52 | 4.37 | 4.21 | 4.04 | 3.53 |

## A Sun-Dial for the Latitude of 54 Degrees.

### North Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hour. | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.37 | 0.35 | 0.34 | 0.33 | 0.32 | 0.31 | 0.29 | 0.28 | 0.27 | 0.26 | 0.25 |
| W | 1.14 | 1.12 | 1.09 | 1.07 | 1.05 | 1.02 | 1.00 | 0.57 | 0.55 | 0.53 | 0.51 |
| W by N | 1.54 | 1.50 | 1.47 | 1.43 | 1.40 | 1.36 | 1.32 | 1.29 | 1.25 | 1.22 | 1.19 |
| W | 2.36 | 2.31 | 2.27 | 2.22 | 2.17 | 2.12 | 2.08 | 2.03 | 1.57 | 1.53 | 1.50 |
| W by S | 3.22 | 3.16 | 3.01 | 3.05 | 2.59 | 2.53 | 2.47 | 2.41 | 2.35 | 2.29 | 2.25 |
| W | 4.12 | 4.05 | 3.59 | 3.52 | 3.45 | 3.39 | 3.32 | 3.24 | 3.17 | 3.11 | 3.06 |
| W by N | 5.05 | 4.58 | 4.51 | 4.43 | 4.36 | 4.29 | 4.21 | 4.13 | 4.05 | 3.58 | 3.53 |
| West | 6.00 | 5.53 | 5.45 | 5.38 | 5.31 | 5.23 | 5.15 | 5.07 | 4.59 | 4.52 | 4.46 |
| W by S | | | | 6.34 | 6.27 | 6.19 | 6.12 | 6.04 | 5.56 | 5.49 | 5.44 |
| N W | | | | | | | 7.09 | 7.01 | 6.54 | 6.48 | 6.43 |
| N W by W | | | | | | | | | 7.51 | 7.46 | 7.42 |
| Set | 6.00 | 6.14 | 6.28 | 6.42 | 6.56 | 7.11 | 7.27 | 7.43 | 8.00 | 8.15 | 8.27 |
| Rising | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. |
| Amp. | 0.00 | 4.12 | 8.32 | 12.49 | 17.11 | 21.36 | 26.7 | 30.45 | 35.55 | 39.37 | 42.43 |

### South Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hour. | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.37 | 0.38 | 0.39 | 0.40 | 0.41 | 0.42 | 0.44 | 0.45 | 0.46 | 0.47 | 0.48 |
| W | 1.14 | 1.16 | 1.19 | 1.21 | 1.24 | 1.26 | 1.28 | 1.31 | 1.33 | 1.35 | 1.37 |
| W by S | 1.54 | 1.57 | 2.01 | 2.04 | 2.08 | 2.11 | 2.15 | 2.19 | 2.23 | 2.26 | 2.28 |
| W | 2.36 | 2.41 | 2.45 | 2.50 | 2.54 | 2.59 | 3.04 | 3.06 | 3.15 | 3.19 | 3.22 |
| W by N | 3.22 | 3.27 | 3.33 | 3.39 | 3.44 | 3.50 | 3.56 | 4.03 | | | |
| N W | 4.12 | 4.18 | 4.24 | 4.31 | 4.38 | 4.45 | | | | | |
| N W by N | 5.05 | 5.12 | 5.19 | | | | | | | | |
| North | 6.00 | | | | | | | | | | |
| Set | 6.00 | 5.46 | 5.32 | 5.18 | 5.04 | 4.49 | 4.33 | 4.17 | 4.00 | 3.45 | 3.33 |

## *A Sun-Dial for the Latitude of* 55 Degrees.

### North Declination.

| Deg. Min. | 0 | d 2 30m | d 5 | d 7 30m | d 10 | d 12 30m | d 15 | d 17 30m | d 20 | d 22 | d |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| *s by w* | 0.37 | 0.36 | 0.35 | 0.34 | 0.33 | 0.31 | 0.30 | 0.29 | 0.28 | 0.27 | |
| *ssw* | 1.15 | 1.13 | 1.10 | 1.08 | 1.06 | 1.03 | 1.01 | 0.59 | 0.56 | 0.54 | |
| *sw bys* | 1.55 | 1.51 | 1.48 | 1.45 | 1.41 | 1.38 | 1.34 | 1.30 | 1.27 | 1.23 | |
| *s w* | 2.37 | 2.33 | 2.28 | 2.24 | 2.19 | 2.14 | 2.10 | 2.05 | 2.00 | 1.55 | |
| *sw bw* | 3.23 | 3.18 | 3.12 | 3.07 | 3.01 | 2.56 | 2.50 | 2.44 | 2.38 | 2.33 | |
| *w s w* | 4.13 | 4.06 | 4.00 | 3.54 | 3.47 | 3.41 | 3.34 | 3.27 | 3.20 | 3.14 | |
| *w by s* | 5.06 | 4.59 | 4.52 | 4.45 | 4.38 | 4.31 | 4.23 | 4.16 | 4.08 | 4.02 | |
| West. | 6.00 | 5.53 | 5.46 | 5.39 | 5.32 | 5.24 | 5.17 | 5.09 | 5.01 | 4.54 | |
| *w by n* | | | | | 6.27 | 6.20 | 6.13 | 6.05 | 5.57 | 5.51 | |
| *w n w* | | | | | | | 7.09 | 7.02 | 6.55 | 6.49 | |
| *nw bw* | | | | | | | | | 7.51 | 7.46 | |
| ⊙ set | 6.00 | 6.14 | 6.29 | 6.43 | 6.58 | 7.14 | 7.30 | 7.47 | 8.05 | 8.21 | |
| Sun's Amp. | d. m. 0.00 | d. m. 4.21 | d. m. 8.45 | d. m. 13.9 | d. m. 17.37 | d. m. 22.10 | d. m. 26.49 | d. m. 31.42 | d. m. 36.36 | d. m. 40.45 | |

### South Declination.

| Deg. Min. | 0 | d 2 30m | d 5 | d 7 30m | d 10 | d 12 30m | d 15 | d 17 30m | d 20 | d 22 | d |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| *s by w* | 0.37 | 0.38 | 0.39 | 0.40 | 0.42 | 0.43 | 0.44 | 0.45 | 0.46 | 0.47 | |
| *ssw* | 1.15 | 1.17 | 1.20 | 1.22 | 1.24 | 1.26 | 1.29 | 1.31 | 1.34 | 1.36 | |
| *sw bys* | 1.55 | 1.58 | 2.01 | 2.05 | 2.08 | 2.12 | 2.16 | 2.19 | 2.23 | 2.26 | |
| *s w* | 2.37 | 2.42 | 2.46 | 2.51 | 2.55 | 3.00 | 3.05 | 3.10 | 3.15 | 3.19 | |
| *sw by w* | 3.23 | 3.29 | 3.34 | 3.40 | 3.45 | 3.51 | 3.57 | 4.03 | | | |
| *w s w* | 4.13 | 4.19 | 4.25 | 4.32 | 4.38 | 4.45 | | | | | |
| *w by s* | 5.06 | 5.12 | 5.19 | | | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ⊙ set | 6.00 | 5.46 | 5.31 | 5.17 | 5.02 | 4.46 | 4.30 | 4.13 | 3.55 | 3.39 | |

## A Sun-Dial for the Latitude of 56 Degrees.

### North Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 25 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hour | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.37 | 0.36 | 0.35 | 0.34 | 0.33 | 0.32 | 0.31 | 0.30 | 0.28 | 0.27 | 0.26 |
| b W | 1.16 | 1.14 | 1.11 | 1.09 | 1.07 | 1.05 | 1.02 | 1.00 | 0.57 | 0.55 | 0.53 |
| by E | 1.56 | 1.53 | 1.49 | 1.46 | 1.43 | 1.39 | 1.26 | 1.32 | 1.28 | 1.26 | 1.23 |
| E | 2.39 | 2.34 | 2.30 | 2.26 | 2.21 | 2.16 | 2.12 | 2.07 | 2.02 | 1.59 | 1.55 |
| E by S | 3.25 | 3.19 | 3.14 | 3.09 | 3.03 | 2.58 | 2.52 | 2.46 | 2.40 | 2.36 | 2.32 |
| E b S | 4.14 | 4.08 | 4.02 | 3.56 | 3.50 | 3.43 | 3.37 | 3.30 | 3.23 | 3.17 | 3.13 |
| E by S | 5.06 | 5.00 | 4.53 | 4.46 | 4.40 | 4.33 | 4.26 | 4.14 | 4.11 | 4.05 | 4.00 |
| West | 6.00 | 5.53 | 5.46 | 5.39 | 5.32 | 5.26 | 5.18 | 5.11 | 5.03 | 4.57 | 4.52 |
| E by N | | | | 6.34 | 6.28 | 6.21 | 6.14 | 6.06 | 6.59 | 5.53 | 5.48 |
| E b N | | | | | | 7.15 | 7.09 | 7.02 | 6.55 | 6.50 | 6.45 |
| E by N | | | | | | | | | 7.51 | 7.46 | 7.43 |
| East | 6.00 | 6.15 | 6.30 | 6.45 | 7.00 | 7.16 | 7.34 | 7.52 | 8.10 | 8.27 | 8.41 |
| Diff. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. | d. m. |
| Amp. | 0.00 | 4.28 | 8.58 | 13.29 | 18.6 | 22.46 | 27.34 | 32.34 | 37.42 | 42.4 | 45.30 |

### South Declination.

| Deg. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hour | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| by W | 0.37 | 0.39 | 0.40 | 0.41 | 0.42 | 0.43 | 0.44 | 0.45 | 0.47 | 0.48 | 0.48 |
| b W | 1.16 | 1.18 | 1.20 | 1.22 | 1.25 | 1.27 | 1.29 | 1.32 | 1.34 | 1.36 | 1.38 |
| by E | 1.56 | 1.59 | 2.02 | 2.06 | 2.09 | 2.13 | 2.16 | 2.20 | 2.24 | 2.26 | 2.29 |
| E | 2.39 | 2.43 | 2.47 | 2.52 | 2.57 | 3.01 | 3.06 | 3.10 | 3.15 | 3.19 | |
| E by S | 3.25 | 3.30 | 3.35 | 3.40 | 3.46 | 3.51 | 3.57 | 4.03 | | | |
| E b S | 4.14 | 4.20 | 4.26 | 4.32 | 4.38 | | | | | | |
| E by S | 5.06 | 5.13 | 5.19 | | | | | | | | |
| West | 6.00 | | | | | | | | | | |
| Diff. | 6.00 | 5.45 | 5.30 | 5.15 | 5.00 | 4.44 | 4.26 | 4.08 | 3.50 | 3.38 | 3.19 |

## *A Sun-Dial for the Latitude of 57 Degrees.*

### North Declination.

| Deg. Min. | 0 | d. 2 30m | d. 5 | d. 7 30m | d. 10 | d. 12 30m | d. 15 | d. 17 30m | d. 20 | d. 22 | d. 2 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s *by* w | 0.38 | 0.37 | 0.36 | 0.35 | 0.34 | 0.32 | 0.31 | 0.30 | 0.29 | 0.28 | 0 |
| s s w | 1.17 | 1.14 | 1.12 | 1.10 | 1.08 | 1.06 | 1.04 | 1.01 | 0.59 | 0.57 | 0 |
| sw *by* s | 1.57 | 1.54 | 1.51 | 1.47 | 1.44 | 1.41 | 1.37 | 1.34 | 1.30 | 1.27 | |
| s w | 2.40 | 2.36 | 2.32 | 2.24 | 2.23 | 2.18 | 2.14 | 2.10 | 2.05 | 2.01 | 2 |
| sw *bw* | 3.26 | 3.21 | 3.16 | 3.11 | 3.05 | 3.00 | 2.55 | 2.49 | 2.43 | 2.38 | 2 |
| w s w | 4.15 | 4.09 | 4.03 | 3.57 | 3.51 | 3.45 | 3.39 | 3.33 | 3.26 | 3.20 | 3 |
| w *by* s | 5.07 | 5.00 | 4.54 | 4.47 | 4.41 | 4.34 | 4.28 | 4.21 | 4.13 | 4.07 | 4 |
| West. | 6.00 | 5.53 | 5.47 | 5.40 | 5.33 | 5.27 | 5.20 | 5.13 | 5.05 | 4.59 | 4 |
| w *by* n | | | | 6.34 | 6.28 | 6.21 | 6.14 | 6.07 | 6.00 | 5.54 | 5 |
| w n w | | | | | | 7.15 | 7.09 | 7.03 | 6.56 | 6.51 | 6 |
| nw *bw* | | | | | | | | | 7.52 | 7.47 | 7 |
| n w | | | | | | | | | | | 8 |
| ☉ set. | 6.00 | 6.16 | 6.31 | 6.47 | 7.03 | 7.20 | 7.38 | 7.56 | 8.16 | 8.34 | 8 |
| Sun's Amp. | d.m. 0.00 | d.m. 4.35 | d.m. 9.13 | d.m. 13.52 | d.m. 18.36 | d.m. 23.24 | d.m. 28.22 | d.m. 33.31 | d.m. 38.53 | d.m. 43.27 | d. |

### South Declination.

| Deg. Min. | 0 | d. 2 30m | d. 5 | d. 7 30m | d. 10 | d. 12 30m | d. 15 | d. 17 30m | d. 20 | d. 22 | d. 2 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h |
| South | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| s *by* w | 0.38 | 0.39 | 0.40 | 0.41 | 0.42 | 0.43 | 0.44 | 0.46 | 0.47 | 0.48 | 0 |
| s s w | 1.17 | 1.19 | 1.21 | 1.23 | 1.25 | 1.27 | 1.30 | 1.32 | 1.38 | 1.36 | |
| sw *by* s | 1.57 | 2.00 | 2.03 | 2.07 | 2.10 | 2.13 | 2.17 | 2.20 | 2.24 | 2.27 | |
| s w | 2.40 | 2.44 | 2.48 | 2.53 | 2.57 | 3.02 | 3.06 | 3.10 | 3.15 | 3.19 | |
| sw *by* w | 3.26 | 3.31 | 3.36 | 3.41 | 3.46 | 3.53 | 3.57 | 4.03 | | | |
| w s w | 4.15 | 4.21 | 4.26 | 4.32 | 4.38 | | | | | | |
| w *by* s | 5.00 | 5.13 | 5.19 | | | | | | | | |
| West. | 6.00 | | | | | | | | | | |
| ☉ set. | 6.00 | 6.44 | 6.29 | 5.13 | 4.57 | 4.40 | 4.22 | 4.04 | 3.44 | 3.26 | |

## A Sun-Dial for the Latitude of 58 Degrees.

### North Declination.

| 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|
| h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| 12. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 0.38 | 0.37 | 0.36 | 0.35 | 0.34 | 0.33 | 0.32 | 0.31 | 0.30 | 0.29 | 0.28 |
| 1.17 | 1.15 | 1.13 | 1.11 | 1.09 | 1.07 | 1.05 | 1.02 | 1.00 | 0.58 | 0.57 |
| 1.58 | 1.55 | 1.52 | 1.49 | 1.46 | 1.42 | 1.39 | 1.35 | 1.32 | 1.29 | 1.27 |
| 2.41 | 2.37 | 2.33 | 2.29 | 2.25 | 2.21 | 2.16 | 2.12 | 2.07 | 2.04 | 2.01 |
| 3.27 | 3.22 | 3.17 | 3.12 | 3.07 | 3.02 | 2.57 | 2.51 | 2.46 | 2.41 | 2.38 |
| 4.16 | 4.10 | 4.05 | 3.59 | 3.53 | 3.47 | 3.41 | 3.55 | 3.29 | 3.23 | 3.19 |
| 5.07 | 5.01 | 4.55 | 4.49 | 4.43 | 4.36 | 4.30 | 4.23 | 4.16 | 4.10 | 4.16 |
| 6.00 | 5.54 | 5.47 | 5.41 | 5.35 | 5.28 | 5.21 | 5.15 | 5.08 | 5.02 | 4.57 |
| | | | 6.34 | 6.28 | 6.22 | 6.15 | 6.08 | 6.02 | 5.56 | 5.51 |
| | | | | | 7.16 | 7.10 | 7.03 | 6.57 | 6.52 | 6.48 |
| | | | | | | | 7.57 | 7.52 | 7.47 | 7.44 |
| | | | | | | | | | | 8.38 |
| 6.00 | 6.16 | 6.32 | 6.49 | 7.06 | 7.24 | 7.42 | 8.01 | 8.22 | 8.41 | 8.56 |
| d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. | d.m. |
| 0.00 | 4.43 | 9.28 | 14.16 | 19.8 | 24.6 | 29.14 | 34.34 | 40.12 | 44.59 | 48.49 |

### South Declination.

| 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|
| h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 0.38 | 0.39 | 0.40 | 0.41 | 0.43 | 0.44 | 0.45 | 0.46 | 0.47 | 0.48 | 0.49 |
| 1.17 | 1.19 | 1.22 | 1.24 | 1.26 | 1.28 | 1.30 | 1.32 | 1.35 | 1.37 | 1.38 |
| 1.58 | 2.01 | 2.04 | 2.07 | 2.10 | 2.14 | 2.17 | 2.21 | 2.24 | 2.27 | 2.29 |
| 2.47 | 2.45 | 2.49 | 2.53 | 2.57 | 3.02 | 3.06 | 3.10 | 2.15 | 2.19 | |
| 3.22 | 3.32 | 3.37 | 3.42 | 3.47 | 3.52 | 3.57 | | | | |
| 4.16 | 4.21 | 4.27 | 4.33 | 4.38 | | | | | | |
| 5.07 | 5.13 | 5.19 | | | | | | | | |
| 6.00 | | | | | | | | | | |
| 6.00 | 5.44 | 5.28 | 5.11 | 4.54 | 4.36 | 4.18 | 3.59 | 3.38 | 3.19 | 3.04 |

## A Sun-Dial for the Latitude of 59 Degrees.

### North Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s by w | 0.39 | 0.38 | 0.37 | 0.36 | 0.35 | 0.34 | 0.32 | 0.31 | 0.30 | 0.29 |
| s s w | 1.18 | 1.16 | 1.14 | 1.12 | 1.10 | 1.08 | 1.06 | 1.04 | 1.01 | 1.00 |
| s w by s | 1.59 | 1.56 | 1.53 | 1.50 | 1.47 | 1.44 | 1.41 | 1.38 | 1.34 | 1.31 |
| s w | 2.42 | 2.38 | 2.35 | 2.31 | 2.27 | 2.23 | 2.19 | 2.14 | 2.10 | 2.06 |
| sw by w | 3.28 | 3.24 | 3.19 | 3.14 | 3.09 | 3.04 | 2.59 | 2.54 | 2.49 | 2.44 |
| w s w | 4.17 | 4.11 | 4.06 | 4.01 | 3.55 | 3.49 | 3.43 | 3.38 | 3.32 | 3.26 |
| w by s | 5.08 | 5.02 | 4.56 | 4.50 | 4.44 | 4.38 | 4.32 | 4.25 | 4.19 | 4.13 |
| West. | 6.00 | 5.54 | 5.48 | 5.42 | 5.36 | 5.29 | 5.23 | 5.16 | 5.09 | 5.02 |
| w by n | | | | 6.35 | 6.29 | 6.22 | 6.16 | 6.10 | 6.03 | 5.56 |
| w n w | | | | | | 7.16 | 7.10 | 7.04 | 6.58 | 6.51 |
| nw by w | | | | | | | | 7.57 | 7.52 | 7.46 |
| n w | | | | | | | | | | 8.45 |
| ☉ sets | 6.00 | 6.16 | 6.33 | 6.50 | 7.08 | 7.27 | 7.46 | 8.07 | 8.29 | 8.45 |
| Sun's Amp. | d. m. 0.00 | d. m. 4.51 | d. m. 9.45 | d. m. 14.41 | d. m. 19.42 | d. m. 24.51 | d. m. 30.10 | d. m. 35.43 | d. m. 42.37 | d. m. 46.[illegible] |

### South Declination.

| Deg. Min. | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d |
|---|---|---|---|---|---|---|---|---|---|---|
| Points | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| South. | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| s by w | 0.39 | 0.40 | 0.41 | 0.42 | 0.43 | 0.44 | 0.45 | 0.46 | 0.47 | 0.48 |
| s s w | 1.18 | 1.20 | 1.22 | 1.24 | 1.26 | 1.28 | 1.31 | 1.33 | 1.35 | 1.37 |
| s w by s | 1.59 | 2.02 | 2.05 | 2.08 | 2.11 | 2.14 | 2.18 | 2.21 | 2.24 | 2.27 |
| s w | 2.42 | 2.46 | 2.50 | 2.54 | 2.58 | 3.02 | 3.06 | 3.11 | 3.15 | |
| sw by w | 3.28 | 3.33 | 3.38 | 3.43 | 3.47 | 3.52 | 3.57 | | | |
| w s w | 4.17 | 4.22 | 4.28 | 4.33 | 4.39 | | | | | |
| w by s | 5.08 | 5.14 | 5.19 | | | | | | | |
| West. | 6.00 | | | | | | | | | |
| ☉ sets | 6.00 | 5.44 | 5.27 | 5.10 | 4.52 | 4.33 | 4.14 | 3.5 | 3.31 | 3.[illegible] |

## A Sun-Dial for the Latitude of 60 Degrees.

### North Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| w | 0.39 | 0.38 | 0.37 | 0.35 | 0.35 | 0.34 | 0.33 | 0.32 | 0.31 | 0.30 | 0.29 |
| w | 1.19 | 1.17 | 1.15 | 1.13 | 1.11 | 1.09 | 1.07 | 1.05 | 1.03 | 1.01 | 1.00 |
| | 2.00 | 1.57 | 1.54 | 1.51 | 1.48 | 1.45 | 1.42 | 1.39 | 1.36 | 1.33 | 1.31 |
| | 2.44 | 2.40 | 2.36 | 2.33 | 2.28 | 2.24 | 2.20 | 2.16 | 2.12 | 2.08 | 2.06 |
| | 3.29 | 3.25 | 3.20 | 3.16 | 3.11 | 3.06 | 3.01 | 2.56 | 2.51 | 2.47 | 2.44 |
| | 4.18 | 4.13 | 4.07 | 4.02 | 3.57 | 3.51 | 3.46 | 3.40 | 3.34 | 3.29 | 3.25 |
| | 5.08 | 5.03 | 4.57 | 4.51 | 4.45 | 4.40 | 4.34 | 4.27 | 4.21 | 4.16 | 4.12 |
| | 6.00 | 5.54 | 5.48 | 5.42 | 5.36 | 5.31 | 5.24 | 5.18 | 5.11 | 5.06 | 5.02 |
| | | | | 6.35 | 6.29 | 6.23 | 6.17 | 6.11 | 6.04 | 5.59 | 5.55 |
| | | | | | | 7.16 | 7.10 | 7.04 | 6.59 | 6.54 | 6.50 |
| | | | | | | | | 7.57 | 7.52 | 7.48 | 7.45 |
| | | | | | | | | | | 8.41 | 8.39 |
| | 6.00 | 6.17 | 6.35 | 6.53 | 7.11 | 7.30 | 7.51 | 8.13 | 8.36 | 8.58 | 0.15 |
| | d. m | d. m | d. m | d. m | d. m | d. m | d. m | d. m | d. m | d. m | d. m |
| | 0.00 | 5.00 | 10.2 | 15.5 | 20.19 | 25.39 | 31.10 | 36.58 | 43.10 | 48.32 | 52.53 |

### South Declination.

| | 0 d | 2 d 30m | 5 d | 7 d 30m | 10 d | 12 d 30m | 15 d | 17 d 30m | 20 d | 22 d | 23 d 30m |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m | h m |
| | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| w | 0.39 | 0.40 | 0.41 | 0.42 | 0.43 | 0.44 | 0.45 | 0.46 | 0.47 | 0.48 | 0.49 |
| w | 1.19 | 1.21 | 1.23 | 1.25 | 1.27 | 1.29 | 1.31 | 1.33 | 1.35 | 1.37 | 1.38 |
| | 2.00 | 2.03 | 2.06 | 2.09 | 2.12 | 2.15 | 2.18 | 2.21 | 2.24 | 2.27 | 2.29 |
| | 2.44 | 2.47 | 2.51 | 2.55 | 2.59 | 3.03 | 3.07 | 3.11 | 3.15 | | |
| | 3.29 | 3.34 | 3.39 | 3.43 | 3.48 | 3.53 | 3.58 | | | | |
| | 4.18 | 4.23 | 4.28 | 4.33 | 4.39 | | | | | | |
| | 5.08 | 5.14 | 5.20 | | | | | | | | |
| | 6.00 | | | | | | | | | | |
| | 6.00 | 5.43 | 5.25 | 5.07 | 4.49 | 4.30 | 4.09 | 3.47 | 3.24 | 3.02 | 2.45 |

# The *Deſcription* and *Uſe* of the Foregoing Tables.

THeſe Tables are tituled at the head of Page thus; A Sun-Dial for the Lati o Degree; the next is, A Sun-Dial Latitude of 1 Degree; and ſo on orderly u Degrees, making in all 61 Dials.

Each Dial hath two Tables, (the upperm North-Declination, the lowermoſt for South nation) and 12 Columns in each Table: at th of each Column, and right againſt Deg. Mi have the degrees of Declination, thus |0 d|2 |5 d|7 d 30 m|10 d|12 d 30 m|15 d|17 d 30 m |22 d|23 d 30 m|: d ſtanding for degree, and minute.

Under thoſe degrees and minutes of Decli in each Column is ſet, |h m|; h ſtands for and m for minute of an hour.

In the left hand Column of each Table, Points, (at the head) is the Points of the Co thus; South; S.by W. S.S.W. S.W.by S. S. S. by W. ſtanding for South and by Weſt; S for South South Weſt; S.W.by S. for South South, and ſo for the reſt.

In this Impreſſion is added at the foot of ea ble, the Sun's-ſetting and Amplitude, agree

ſeveral Declinations at the head of each Co-
, and are diſtinguiſhed from the reſt by the
ds in the left hand Golumn, thus; Sun ſets;
Amplitude; or ſo much of them as the Co-
can contain.

ote; The Sun's Setting is annexed to each Ta-
ble; but the Amplitude only to that for North-
Declination, becauſe it is the ſame (for quan-
tity) for South.

Setting is hours and minutes, but the Ampli-
tude is degrees and minutes, having (d) over
the degrees, and (m) over the minutes.

theſe Tables, being Sun-Dials for all Lati-
, you may know the time of the Day, the Sun
viſible in any part of your Hemiſphere, as
nd exact, as tho he were upon your Meridian;
is Riſing, Setting and Amplitude. The like
e known by any Star, whoſe Declination doth
ceed 23 d. 30 m. as will be evident by the fol-
Propoſition.

*Propoſition* 1.

Latitude of the Place, the Declination, and
earing of the Sun given; to find the hour of
y.

e; By Bearing, is meant the Azimuth, or
of the Compaſs he is upon; and that is found
ing the Sun with an Azimuth Compaſs: which
neſt way.

*The Reſolution of this Propoſition, is thus;*

1. Seek the *Sun-Dial* for the given Latitude
2. At the head of the Table (proper for t clination) ſeek the given Declination, or the n to it.
3. Find the Given, bearing among the Po the Compaſs in the left hand Column.
4. Then look ſtraight to the right-hand Bearing, till you come right under the Decli (before found in the head of the Table;) and number you find there, is the hour required.

*Example* 1.

In the Latitude of 30 d. the Sun having 15 d Declination; I deſire to know at what a Clo Sun cometh upon the S. W. Point of the Comp

Look for the Table that belongeth to the L of 30 d. in the head of the Table, and for 15 the Column of North Declination, and for S. the left hand of the Table, and in the common of meeting I find the hour of the Day to be o h that is, 58 m. paſt 12 a Clock; which is the t quired.

*Example* 2.

I deſire to know at what a Clock the Sun to the South-weſt as aforeſaid, and in the Lati 30 d. as aforeſaid, the Sun having 15 d. o m. Declination? *Anſwer*, 34 m. paſt 2 a Clock.

For if you turn to the *Dial* for *Latitude* and in the Table for South-Declination, ſeek the head of it, under which, and againſt S. W

*

left-hand) you will find 2 h. 34 min. the time of Day required.

If your Declination be not the ſame with the Declination in the head of the Table, then you muſt look under that Declination in the head of the Table that is neareſt to the Declination propoſed:

But more exactly thus; Find the *Hour for the next Declination both leſſer and greater than the Declination propoſed*, and take the Difference of thoſe *Hours*, as alſo of the Declinations belonging to them; then ſay,

As the laſt Difference is to the firſt Difference, ſo the Difference between the Declination propoſed, and the next leſſer in the Table, to a fourth proportional, which add to (*when the hour in the Table increaſeth*) or (*when it decreaſeth*) ſubtract from the hour belonging to the leſſer Declination aforeſaid: you'l have the hour required exact to the Declination propoſed.

*Example* 3.

Admit the Declination to be 18 d. 20 m. North, I am to know at what a Clock the Sun cometh upon the W. S. W. Point of the Compaſs, in the Latitude of 30 deg.

I look in the head of the Table, and I find that the neareſt number to 18 d. 20 m. is 17 d. 30 m. I look over 17 d. 30 m. and againſt W. S. W. I find 1 h. 42 m. which ſheweth that the Sun cometh upon the W. S. W. Point of the Compaſs, at 42 m. paſt 1 a Clock.

Now becauſe the *Declination* propoſed, and *Declination* in the head of the Table, are ſome differing; therefore you may make a Proportion which you may eaſily gueſs at, as under 17 d. 3 and againſt W. S. W. you find 1 h. 42 m. and u 20 d. 0 m. you find 1 d. 25 m. the difference betw theſe two Numbers is 17 m. And the difference tween the Declinations 17 d. 30 m. and 20 d. is 30 m. or 150 m. Alſo the difference between the clinations 18 d. 20 m. and 17 d. 30 m. is 50 m. T ſay; As 150 m. is to 17 m. ſo is 50 m. to 6 m. alm But becauſe 50 is $\frac{1}{3}$ of 150, therefore the third of 17 m. is near 6 m. which muſt be ſubtracted f 1 h. 42 m. (becauſe the hour decreaſeth) and Remainder will be 1 h. 36 m. which is the true of the Day, the Sun being upon the W.S.W. poi the Compaſs, having 18 d. 20 m. North Declina You may do the like with any other deg. and of Declination. But if your Declination be not n differing from that in the head of the Table, then need not make any Proportion. Likewiſe, if the be near the Meridian, you need not make any portion, becauſe there the difference is but ſma

*Note*; There is none but the Afternoon Poin down in the Tables of theſe Dials, but you may find the time of the Day for any of the Fore Points by the Table and what follows.

| *A Table of Points of the Compaſs equally diſtant from the Meridian.* | |
|---|---|
| *Forenoon Points.* | *Afternoon Points.* |
| South. | |
| S. by E. | S. by W. |
| S. S. E. | S. S. W. |
| S. E. by S. | S. W. by S. |
| S. E. | S. W. |
| S. E. by E. | S. W. by W. |
| E. S. E. | W. S. W. |
| E. by S. | W. by S. |
| East. | West. |
| E. by N. | W. by N. |
| E. N. E. | W. N. W. |
| N. E. by E. | N. W. by W. |
| N. E. | N. W. |
| N. E. by N. | N. W. by N. |
| N. N. E. | N. N. W. |
| N. by E. | N. by W. |
| North. | |
| *Forenoon Points.* | *Afternoon Points.* |

or this is an undoubted truth, That Points of the pafs equally diſtant from the Meridian, are alſo l Time from Noon; ſo that at what ſpace of e from Noon the Sun is S. E. in the Forenoon, like ſpace of Time from Noon he is S. W. after on.

In this laſt Table, all thoſe Points that ſtand ri
againſt one another, are equally diſtant from the
ridian; therefore to find the hour of the Day,
Sun being upon any of the *Forenoon Points*, you
firſt ſee what time of the day it is when the S
upon the *Afternoon Point* that ſtands right ag
your *Forenoon Point* deſired: then ſubtract t
hours and minutes ſo found, from 12 hours, and
Remainder is the hour and minute of the Day
you look after.

*Example* 4. In the Latitude of 60 degrees, the
being upon the N.E. Point of the Compaſs, I dem
the hour of the Day, the Sun having 22 deg
North Declination?

Firſt, In the Sun-Dial for Latitude of 60 degr
I look againſt N. W. which is the *Afternoon P*
correſpondent to N.E. my *Forenoon Point*, and
ing my Declination 22 degrees in the head of
Table, in the common Angle of meeting I fi
hours 41 min. which being ſubtracted from 12 ho
the Remainder will be 7 hours 19 min. which i
hour of the Day deſired.

*Example* 5. The Sun being at E. N. E. in the
Latitude with the ſame Declination, I demand
hour of the Day?

In Latitude 60 degrees, and North Declina
22 d. the Sun being at W. N. W. it is 54 min. p
a Clock in the Afternoon; which ſubtract fro
hours, and the Remainder is 6 minutes paſt 5 i
morning; which is the time deſired.

*Example* 6. In the Latitude of 35 d. the Sun ha

d. North Declination, the Sun being upon the by E. Point of the Compaſs; I demand the hour minute of the Day?

irſt; In the Table for Latitude 35 deg. I look irſt S. W. by W. which is the *Afternoon Point* reſpondent to S. E. by E. my *Forenoon Point*. And ing my Declination 15 d. in the head of the Ta- in the common Angle of meeting I find 1 h. 45 m. ich deducted from 12 hours, the Remainder will 15 m. paſt 10 a Clock, which is the true time of Day deſired.

*Example 7*. In the Latitude of 35 d. North, the Sun ing 15 d. South Declination, and being upon the by E. Point of the Compaſs; I demand the hour the Day?

*Anſwer*, 20 m. paſt 8 a Clock; for the hour in the ble is 3 h. 40 m. which ſubtracted from 12 h. veth 8 h. 20 m. the hour required.

The like is to be underſtood in any other Lati- e, with any other Declination, and with any o- Point.

*Note*; Theſe Tables ſerve as well in South Lati- e as in North, only the Difference will be this: f the Latitude be contrary, then the Declination ſt be contrary, and the Points of the Compaſs ſt be contrary; that is to ſay, your North Decli- ion muſt be South, and your South Declination ſt be North; and South muſt be North, and S. by muſt be N. by W. and S.S.W. muſt be N.N.W. S. W. by S. muſt be N. W. by N. and ſo you ſt reckon for any other Point, as you may plainly in this following Table.

*A Table of Points equally distant from N*
*both in North and South Latitude; ei*
*before or after Noon.*

| *North Latitude.* | | *South Latitude.* | |
|---|---|---|---|
| *Forenoon.* | *Afternoon.* | *Forenoon.* | *Afternoon.* |
| South. | South. | North. | North. |
| S. by E. | S. by W. | N. by E. | N. by W. |
| S. S. E. | S. S. W. | N. N. E. | N. N. W. |
| S. E. by S. | S. W. by S. | N. E. by N. | N. W. by N. |
| S. E. | S. W. | N. E. | N. W. |
| S. E. by E. | S. W. by W. | N. E. by E. | N. W. by W. |
| E. S. E. | W. S. W. | E. N. E. | W. N. W. |
| E. by S. | W. by S. | E. by N. | W. by N. |
| East. | West. | East. | West. |
| E. by N. | W. by N. | E. by S. | W. by S. |
| E. N. E. | W. N. W. | E. S. E. | W. S. W. |
| N. E. by E. | N. W. by W. | S. E. by E. | S. W. by W. |
| N. E. | N. W. | S. E. | S. W. |
| N. E. by N. | N. W. by N. | S. E. by S. | S. W. by S. |
| N. N. E. | N. N. W. | S. S. E. | S. S. W. |
| N. by E. | N. by W. | S. by E. | S. by W. |
| North. | | | |

*To find the Hour of the Night by the Stars and Tables of the Sun-Dial.*

BY these Tables you may find the Hour of Night, by the bearing of any known S wh

hoſe Declination doth not exceed the Sun's greateſt
clination; which you may do after this manner.
*First*; Find the time of your known Star's com-
g to the Meridian on the Day propos'd; then if the
ar be on the Eaſt ſide of the Meridian, you muſt
btract thoſe hours and minutes which theſe Tables
w the Star to be diſtant from the Meridian,
m the time of the Star's coming to the Meridian,
d the Remainder is the true hour of the Night.
t if your Star be on the Weſt-ſide of the Meridian,
n you muſt add thoſe hours and minutes above-
d to the time of the Star's coming to the Meridian
aforeſaid, and the Sum is the true hour of the
ght.
To find a Star's coming on or to the Meridian, ſee
e Sea-man's Kalendar in the Uſes of the Tables of
Sun's and Star's Right Aſcenſion, pag. 91, 92,
, *&c.*

*Example* 8

Admit the 6th day of *October*, I am in Latitude
d. 0 m. and I obſerve the *Bull's Eye* to be upon the
E. Point of the Compaſs; I demand the hour of the
ght?
The 6th Day of *October* the *Bull's Eye* doth come
the Meridian at 45 minutes paſt 2 a Clock in the
rning; now this Star's Declination is 15 d. 48 m.
rth; therefore I look in the Table that belongs to
d. and in the head of the Table I find the Decli-
ion, and by the ſide the Point of the Compaſs
eſpondent to my Bearing; and in the common
le of meeting I find 1 hour 31 m. which is to

be

be ſubtracted from 2 d. 45 m. which is the Star's S
thing, and the Remainder is 1 h. 14 m. which is
hour of the Night deſired. But if this Star had b
S. W. you muſt have added, and then you wo
have found the hour of the Night to have been 16
paſt 4 a Clock in the Morning.

*The Operation.*

| | d. | m. |
|---|---|---|
| The time of the Star's being on the Meridian | 2, | 45 |
| His diſt. from the Mer. either at S.E. or S.W. | 1, | 31 |
| The time of the Night, the Star being at S.E. | 1, | 14 |
| The time of the Night, the Star being at S.W. | 4, | 16 |

*Example 9.*

Admit the 5th Day of *November*, I am in Latit
45 d. 0 m. and I ſee the *Lion's Tail* to be upon the
S. E. Point of the Compaſs, having Declination 16
25 m. North; I demand the hour of the Night?

| | h. | m. |
|---|---|---|
| The time of this Star's being on the Merid. | 08 | 09 |
| His diſtance from the Meridian | 03 | 00 |
| The time of the Night, the Star being at E. S. E. | 05 | 09 |
| At W. S. W. | 11 | 09 |

But note; If the Compaſs hath Variation, you m
allow for the Variation; and if you will uſe this
low

owing Inſtrument, which I call a Rectifier, you need ot put your ſelf to that trouble, as to reckon which way the Variation is, either Eaſtward or Weſtward; s formerly all have done: but this following Inſtrument will do that for you, and it will ſhew you very Point ſo plain, that you cannot be miſtaken, as I will plainly ſhew you in the following part of this Book, when I come to ſhew you how to find the Variation; but for the preſent I will only give you one Propoſition, and apply it upon the Rectifier, which s as followeth.

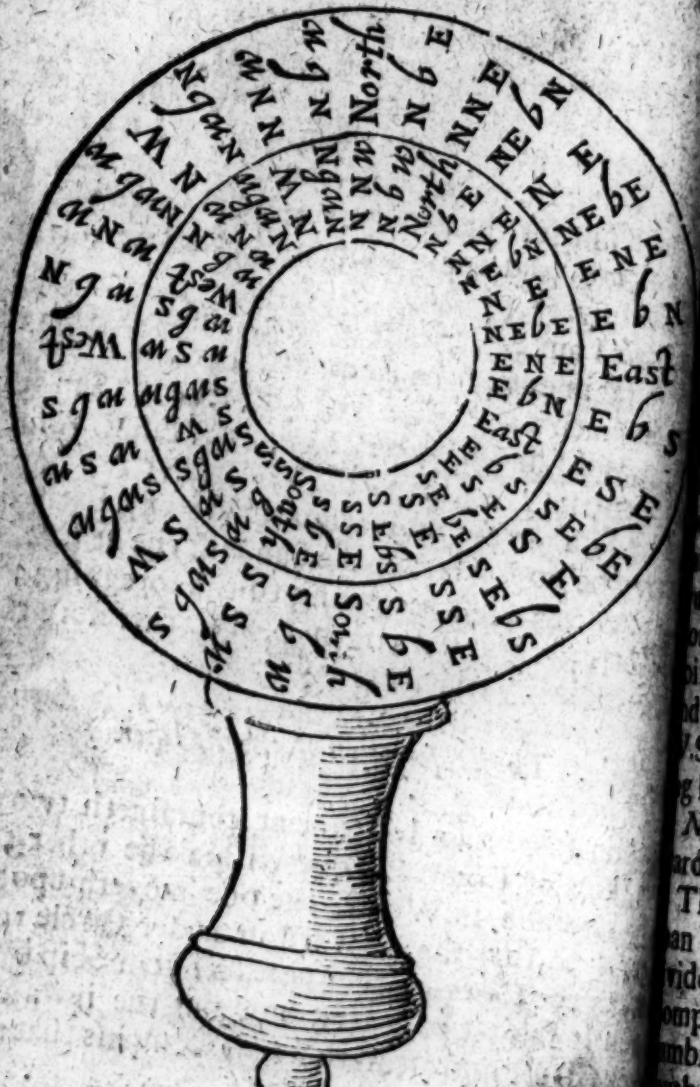
Admit I am in Latitude 47 deg. 0 min. North, the Sun being in one of the Equinoctial Points, (at which time he hath no Declination) I obſerve the Sun at his Riſing, and I find him to riſe upon the E.S.E. Point of the Compaſs; I demand the Variation?

The Sun having no Declination in any Latitude; if there be no Variation, the Sun will riſe at Eaſt, and ſet at Weſt; but according to the foregoing Propoſition, the Sun did riſe at E. S. E. therefore there s two Points Variation.

## *The Deſcription of the Rectifier.*

THis following Inſtrument containeth two Circles or Compaſſes one within the other; but s it is made in Wood, the one moveth upon the other; ſo that the outward or under Circle repreſenteth the Compaſs that you ſteer your Ship by, the which is ſubject to Variation; but the inward, or upper Circle, repreſenteth a true Compaſs that never varieth.

## A RECTIFIER.



rieth. And by it you may very readily rectify your der Compaſs, when it doth vary, which may be ne thus:

Always bring the true Point of Riſing or Setting the inward or upper Compaſs, to touch the falſe int of Riſing or Setting on the outward or under ompaſs, and there let the Inſtrument ſtand.

As in this foregoing Propoſition: The Eaſt-point the true Point of Riſing, and the E.S.E. Point is the lſe Point of riſing; therefore bring the Eaſt-point the inward or upper Compaſs to touch the E.S.E. int on the outward or under Compaſs, and there it ſtand.

Thus the Points that are upon the inward Com-ſs, do explain the Points that are upon the outward ompaſs: So that according to the foregoing Obſer-tion the N. N. E. Point on your Compaſs, is the e North Point; and the North Point on your ompaſs, is the true N.N.W. Point; and the N.W int on your Compaſs, is the true W.N.W. Point, d the Weſt Point on your Compaſs, is the true .S.W. Point, as it plainly appears by the forego-g Figure.

*Note*; Your true Points are always on your in-rd Circle or Compaſs.

This Inſtrument in Wood, is a great deal larger an this Figure ſheweth it, and there the Points be ided into Halves and Quarters; as alſo each ompaſs (in ſome) is divided into 360 degrees, mbred from the North, both ways towards the uth, their ending in 180 degrees.

To

*To find the Sun's Riſing, Setting, or Amplitude by the Tables of Sun-Dials.*

IN the Table for the Latitude of the Place, the Declination, under which, and againſt ☉ is his Setting; and againſt Sun's Amp. is the Amplitude; all which is ſo plain, it needs no Example.

Only obſerve, if you ſubtract the Sun's Set from 12 hours, it gives his Riſing.

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*Aſtronomical* TABLES *of* Semidiurnal *and* Seminocturnal Arches: *Shewing the true Time of the* SUN's *Riſing and Setting with the Length of the Day and Night, any Day in the Year; fitting all Places in the World, whoſe Pole is not elevated above* Degrees, *either North or South; and to* with Exactneſs, *as long as God upholdeth* Courſe of Nature.

A Table shewing the Semidiurnal-Arch, or the Time of Sun-setting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-rising, when the Sun hath South Declination.

The Degrees of Latitude.

| ☉ | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sign. | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 |
| 1 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 |
| 2 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 01 | 6 | 01 |
| 3 | 6 | 00 | 6 | 00 | 6 | 01 | 6 | 01 | 6 | 01 | 6 | 01 |
| 4 | 6 | 00 | 6 | 00 | 6 | 01 | 6 | 01 | 6 | 01 | 6 | 02 |
| 5 | 6 | 00 | 6 | 00 | 6 | 01 | 6 | 01 | 6 | 02 | 6 | 02 |
| 6 | 6 | 00 | 6 | 01 | 6 | 01 | 6 | 02 | 6 | 02 | 6 | 03 |
| 7 | 6 | 00 | 6 | 01 | 6 | 01 | 6 | 02 | 6 | 02 | 6 | 03 |
| 8 | 6 | 00 | 6 | 01 | 6 | 02 | 6 | 02 | 6 | 03 | 6 | 03 |
| 9 | 6 | 01 | 6 | 01 | 6 | 02 | 6 | 03 | 6 | 03 | 6 | 04 |
| 10 | 6 | 01 | 6 | 01 | 6 | 02 | 6 | 03 | 6 | 04 | 6 | 04 |
| 11 | 6 | 01 | 6 | 01 | 6 | 02 | 6 | 03 | 6 | 04 | 6 | 05 |
| 12 | 6 | 01 | 6 | 02 | 6 | 02 | 6 | 03 | 6 | 04 | 6 | 05 |
| 13 | 6 | 01 | 6 | 02 | 6 | 03 | 6 | 04 | 6 | 05 | 6 | 06 |
| 14 | 6 | 01 | 6 | 02 | 6 | 03 | 6 | 04 | 6 | 05 | 6 | 06 |
| 15 | 6 | 01 | 6 | 02 | 6 | 03 | 6 | 04 | 6 | 05 | 6 | 06 |
| 16 | 6 | 01 | 6 | 02 | 6 | 03 | 6 | 05 | 6 | 06 | 6 | 07 |
| 17 | 6 | 01 | 6 | 02 | 6 | 04 | 6 | 05 | 6 | 06 | 6 | 07 |
| 18 | 6 | 01 | 6 | 03 | 6 | 04 | 6 | 05 | 6 | 07 | 6 | 08 |
| 19 | 6 | 01 | 6 | 03 | 6 | 04 | 6 | 05 | 6 | 07 | 6 | 08 |
| 20 | 6 | 01 | 6 | 03 | 6 | 04 | 6 | 06 | 6 | 07 | 6 | 09 |
| 21 | 6 | 02 | 6 | 03 | 6 | 05 | 6 | 06 | 6 | 08 | 6 | 09 |
| 22 | 6 | 02 | 6 | 03 | 6 | 05 | 6 | 06 | 6 | 08 | 6 | 10 |
| 23 | 6 | 02 | 6 | 03 | 6 | 05 | 6 | 07 | 6 | 09 | 6 | 10 |
| 31 | 6 | 02 | 6 | 04 | 6 | 05 | 6 | 07 | 6 | 09 | 6 | 11 |

*A Table shewing the Semidiurnal-Arch, or the Time of Sun-s when the Sun hath North Declination; and the Semidiurnal- or the Time of Sun-rising, when the Sun hath South Declinati*

The Degrees of Latitude.

| Sun's Decli. | 7 | | 8 | | 9 | | 10 | | 11 | | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 |
| 1 | 6 | 00 | 6 | 00 | 6 | 01 | 6 | 01 | 6 | 01 | 6 |
| 2 | 6 | 01 | 6 | 01 | 6 | 01 | 6 | 01 | 6 | 02 | 6 |
| 3 | 6 | 01 | 6 | 02 | 6 | 02 | 6 | 02 | 6 | 02 | 6 |
| 4 | 6 | 02 | 6 | 02 | 6 | 02 | 6 | 03 | 6 | 03 | 6 |
| 5 | 6 | 02 | 6 | 03 | 6 | 03 | 6 | 04 | 6 | 04 | 6 |
| 6 | 6 | 03 | 6 | 03 | 6 | 04 | 6 | 04 | 6 | 05 | 6 |
| 7 | 6 | 03 | 6 | 04 | 6 | 04 | 6 | 05 | 6 | 05 | 6 |
| 8 | 6 | 04 | 6 | 04 | 6 | 05 | 6 | 06 | 6 | 06 | 6 |
| 9 | 6 | 04 | 6 | 05 | 6 | 06 | 6 | 06 | 6 | 07 | 6 |
| 10 | 6 | 05 | 6 | 06 | 6 | 06 | 6 | 07 | 6 | 08 | 6 |
| 11 | 6 | 05 | 6 | 06 | 6 | 07 | 6 | 08 | 6 | 09 | 6 |
| 12 | 6 | 06 | 6 | 07 | 6 | 08 | 6 | 09 | 6 | 09 | 6 |
| 13 | 6 | 06 | 6 | 07 | 6 | 08 | 6 | 09 | 6 | 10 | 6 |
| 14 | 6 | 07 | 6 | 08 | 6 | 09 | 6 | 10 | 6 | 11 | 6 |
| 15 | 6 | 08 | 6 | 09 | 6 | 10 | 6 | 11 | 6 | 12 | 6 |
| 16 | 6 | 08 | 6 | 09 | 6 | 10 | 6 | 12 | 6 | 13 | 6 |
| 17 | 6 | 09 | 6 | 10 | 6 | 11 | 6 | 12 | 6 | 14 | 6 |
| 18 | 6 | 09 | 6 | 10 | 6 | 12 | 6 | 13 | 6 | 14 | 6 |
| 19 | 6 | 10 | 6 | 11 | 6 | 13 | 6 | 14 | 6 | 15 | 6 |
| 20 | 6 | 10 | 6 | 12 | 6 | 14 | 6 | 15 | 6 | 16 | 6 |
| 21 | 6 | 11 | 6 | 12 | 6 | 14 | 6 | 16 | 6 | 17 | 6 |
| 22 | 6 | 11 | 6 | 13 | 6 | 15 | 6 | 16 | 6 | 18 | 6 |
| 23 | 6 | 12 | 6 | 14 | 6 | 15 | 6 | 17 | 6 | 19 | 6 |
| 23,31 | 6 | 12 | 6 | 14 | 6 | 16 | 6 | 18 | 6 | 19 | 6 |

Degrees of Declination.

*Table shewing the Semidiurnal-Arch, or the Time of Sun-setting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-rising, when the Sun hath South Declination.*

The Degrees of Latitude.

| ☉ | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 |
| 1 | 6 | 01 | 5 | 01 | 6 | 01 | 6 | 01 | 6 | 01 | 6 | 01 |
| 2 | 6 | 02 | 5 | 02 | 6 | 02 | 6 | 02 | 6 | 02 | 6 | 02 |
| 3 | 6 | 03 | 5 | 03 | 6 | 03 | 6 | 03 | 6 | 04 | 6 | 04 |
| 4 | 6 | 04 | 6 | 04 | 6 | 04 | 6 | 05 | 6 | 05 | 6 | 05 |
| 5 | 6 | 05 | 6 | 05 | 6 | 05 | 6 | 06 | 6 | 06 | 6 | 06 |
| 6 | 6 | 06 | 5 | 06 | 6 | 06 | 6 | 07 | 6 | 07 | 6 | 08 |
| 7 | 6 | 06 | 6 | 07 | 6 | 07 | 6 | 08 | 6 | 09 | 6 | 09 |
| 8 | 6 | 07 | 5 | 08 | 6 | 09 | 6 | 09 | 6 | 10 | 6 | 10 |
| 9 | 6 | 08 | 5 | 09 | 6 | 10 | 6 | 10 | 6 | 11 | 6 | 12 |
| 10 | 6 | 09 | 6 | 10 | 6 | 11 | 6 | 12 | 6 | 12 | 6 | 13 |
| 11 | 6 | 10 | 6 | 11 | 6 | 12 | 6 | 13 | 6 | 13 | 5 | 14 |
| 12 | 6 | 11 | 6 | 12 | 6 | 13 | 6 | 14 | 6 | 15 | 6 | 16 |
| 13 | 6 | 12 | 6 | 13 | 6 | 14 | 6 | 15 | 6 | 16 | 6 | 17 |
| 14 | 6 | 13 | 6 | 14 | 6 | 15 | 6 | 16 | 6 | 17 | 6 | 19 |
| 15 | 6 | 14 | 6 | 15 | 6 | 16 | 6 | 18 | 6 | 19 | 6 | 20 |
| 16 | 6 | 15 | 6 | 16 | 6 | 18 | 6 | 19 | 6 | 20 | 6 | 21 |
| 17 | 6 | 16 | 6 | 17 | 6 | 19 | 6 | 20 | 6 | 21 | 6 | 23 |
| 18 | 6 | 17 | 6 | 19 | 6 | 20 | 6 | 21 | 6 | 23 | 6 | 24 |
| 19 | 6 | 18 | 6 | 20 | 6 | 21 | 6 | 23 | 6 | 24 | 6 | 26 |
| 20 | 6 | 19 | 6 | 21 | 6 | 22 | 6 | 24 | 6 | 25 | 6 | 27 |
| 21 | 6 | 20 | 6 | 22 | 6 | 24 | 6 | 25 | 6 | 27 | 6 | 29 |
| 22 | 6 | 21 | 6 | 23 | 6 | 25 | 6 | 27 | 6 | 28 | 6 | 30 |
| 23 | 6 | 22 | 6 | 24 | 5 | 26 | 6 | 28 | 6 | 30 | 6 | 32 |
| 31 | 6 | 23 | 6 | 25 | 5 | 27 | 6 | 29 | 6 | 31 | 6 | 33 |

*A Table shewing the Semidiurnal-Arch, or the Time of Sun- when the Sun hath North Declination; and the Seminocturnal or the Time of Sun-rising, when the Sun hath South Declina*

The Degrees of Latitude.

| Sun's Declin. | 19 | | 20 | | 21 | | 22 | | 23 | | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 |
| 1 | 6 | 01 | 6 | 01 | 6 | 01 | 6 | 02 | 6 | 02 | 6 |
| 2 | 6 | 03 | 6 | 03 | 6 | 03 | 6 | 03 | 6 | 03 | 6 |
| 3 | 6 | 04 | 6 | 04 | 6 | 05 | 6 | 05 | 6 | 05 | 6 |
| 4 | 6 | 05 | 6 | 06 | 6 | 06 | 6 | 06 | 6 | 07 | 6 |
| 5 | 6 | 07 | 6 | 07 | 6 | 08 | 6 | 08 | 6 | 09 | 6 |
| 6 | 6 | 08 | 6 | 09 | 6 | 09 | 6 | 10 | 6 | 10 | 6 |
| 7 | 6 | 10 | 6 | 10 | 6 | 11 | 6 | 11 | 6 | 12 | 6 |
| 8 | 6 | 11 | 6 | 12 | 6 | 12 | 6 | 13 | 6 | 14 | 6 |
| 9 | 6 | 13 | 6 | 13 | 6 | 14 | 6 | 15 | 6 | 15 | 6 |
| 10 | 6 | 14 | 6 | 15 | 6 | 16 | 6 | 16 | 6 | 17 | 6 |
| 11 | 6 | 15 | 6 | 16 | 6 | 17 | 6 | 18 | 6 | 19 | 6 |
| 12 | 6 | 17 | 6 | 18 | 6 | 19 | 6 | 20 | 6 | 21 | 6 |
| 13 | 6 | 18 | 6 | 19 | 6 | 20 | 6 | 21 | 6 | 23 | 6 |
| 14 | 6 | 20 | 6 | 21 | 6 | 22 | 6 | 23 | 6 | 24 | 6 |
| 15 | 6 | 21 | 6 | 22 | 6 | 24 | 6 | 25 | 6 | 26 | 6 |
| 16 | 6 | 23 | 6 | 24 | 6 | 25 | 6 | 27 | 6 | 28 | 6 |
| 17 | 6 | 24 | 6 | 25 | 6 | 27 | 6 | 28 | 6 | 30 | 6 |
| 18 | 6 | 26 | 6 | 27 | 6 | 29 | 6 | 30 | 6 | 32 | 6 |
| 19 | 6 | 27 | 6 | 29 | 6 | 30 | 6 | 32 | 6 | 34 | 6 |
| 20 | 6 | 28 | 6 | 30 | 6 | 32 | 6 | 34 | 6 | 36 | 6 |
| 21 | 6 | 30 | 6 | 32 | 6 | 34 | 6 | 36 | 6 | 37 | 6 |
| 22 | 6 | 31 | 6 | 33 | 6 | 35 | 6 | 37 | 6 | 39 | 6 |
| 23 | 6 | 33 | 6 | 35 | 6 | 37 | 6 | 39 | 6 | 41 | 6 |
| 23,31 | 6 | 34 | 6 | 36 | 6 | 38 | 6 | 40 | 6 | 43 | 6 |

Degrees of Declination.

A Table shewing the Semidiurnal-Arch, or the Time of Sun-setting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-rising, when the Sun hath South Declination.

The Degrees of Latitude.

| Sun's Decli. | 25 | | 26 | | 27 | | 28 | | 29 | | 30 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 |
| 1 | 6 | 02 | 6 | 02 | 6 | 02 | 6 | 02 | 6 | 02 | 6 | 02 |
| 2 | 6 | 04 | 6 | 04 | 6 | 04 | 6 | 04 | 6 | 04 | 6 | 05 |
| 3 | 6 | 06 | 6 | 06 | 6 | 06 | 6 | 06 | 6 | 07 | 6 | 07 |
| 4 | 6 | 07 | 6 | 08 | 6 | 08 | 6 | 09 | 6 | 09 | 6 | 09 |
| 5 | 6 | 09 | 6 | 10 | 6 | 10 | 6 | 11 | 6 | 11 | 6 | 12 |
| 6 | 6 | 11 | 6 | 12 | 6 | 12 | 6 | 13 | 6 | 13 | 6 | 14 |
| 7 | 6 | 13 | 6 | 14 | 6 | 14 | 6 | 15 | 6 | 16 | 6 | 16 |
| 8 | 6 | 15 | 6 | 16 | 6 | 16 | 6 | 17 | 6 | 18 | 6 | 19 |
| 9 | 6 | 17 | 6 | 18 | 6 | 19 | 6 | 19 | 6 | 20 | 6 | 21 |
| 10 | 6 | 19 | 6 | 20 | 6 | 21 | 6 | 22 | 6 | 23 | 6 | 23 |
| 11 | 6 | 21 | 6 | 22 | 6 | 23 | 6 | 24 | 6 | 25 | 6 | 26 |
| 12 | 6 | 23 | 6 | 24 | 6 | 25 | 6 | 26 | 6 | 27 | 6 | 28 |
| 13 | 6 | 25 | 6 | 26 | 6 | 27 | 6 | 28 | 6 | 29 | 6 | 31 |
| 14 | 6 | 27 | 6 | 28 | 6 | 29 | 6 | 30 | 6 | 32 | 6 | 33 |
| 15 | 6 | 29 | 6 | 30 | 6 | 31 | 6 | 33 | 6 | 34 | 6 | 36 |
| 16 | 6 | 31 | 6 | 32 | 6 | 34 | 6 | 35 | 6 | 37 | 6 | 38 |
| 17 | 6 | 33 | 6 | 34 | 6 | 36 | 6 | 37 | 6 | 39 | 6 | 41 |
| 18 | 6 | 35 | 6 | 36 | 6 | 38 | 6 | 40 | 6 | 42 | 6 | 43 |
| 19 | 6 | 37 | 6 | 39 | 6 | 40 | 6 | 42 | 6 | 44 | 6 | 46 |
| 20 | 6 | 39 | 6 | 41 | 6 | 43 | 6 | 45 | 6 | 47 | 6 | 48 |
| 21 | 6 | 41 | 6 | 43 | 6 | 45 | 6 | 47 | 6 | 49 | 6 | 51 |
| 22 | 6 | 43 | 6 | 45 | 6 | 48 | 6 | 50 | 6 | 52 | 6 | 54 |
| 23 | 6 | 46 | 6 | 48 | 6 | 50 | 6 | 52 | 6 | 54 | 6 | 57 |
| 23,31 | 6 | 47 | 6 | 49 | 6 | 51 | 6 | 53 | 6 | 56 | 6 | 59 |

Degrees of Declination.

*A Table shewing the Semidiurnal Arch, or the Time of Sun-rising when the Sun hath North Declination; and the Seminocturnal, or the Time of Sun-rising, when the Sun hath South Declination.*

The Degrees of Latitude.

| Sun's Decli. | 31 H. | 31 M. | 32 H. | 32 M. | 33 H. | 33 M. | 34 H. | 34 M. | 35 H. | 35 M. | 36 H. | 36 M. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 0 |
| 1 | 6 | 02 | 6 | 02 | 6 | 03 | 6 | 03 | 6 | 03 | 6 | 0 |
| 2 | 6 | 05 | 6 | 05 | 6 | 05 | 6 | 05 | 6 | 06 | 6 | 0 |
| 3 | 6 | 07 | 6 | 08 | 6 | 08 | 6 | 08 | 6 | 08 | 6 | 0 |
| 4 | 6 | 10 | 6 | 10 | 6 | 10 | 6 | 11 | 6 | 11 | 6 | 1 |
| 5 | 6 | 12 | 6 | 13 | 6 | 13 | 6 | 14 | 6 | 14 | 6 | 1 |
| 6 | 6 | 15 | 6 | 15 | 6 | 16 | 6 | 16 | 6 | 17 | 6 | 1 |
| 7 | 6 | 17 | 6 | 18 | 6 | 18 | 6 | 19 | 6 | 20 | 6 | 2 |
| 8 | 6 | 19 | 6 | 20 | 6 | 21 | 6 | 22 | 6 | 23 | 6 | 2 |
| 9 | 6 | 22 | 6 | 23 | 6 | 24 | 6 | 25 | 6 | 25 | 6 | 2 |
| 10 | 6 | 24 | 6 | 25 | 6 | 26 | 6 | 27 | 6 | 28 | 6 | 2 |
| 11 | 6 | 27 | 6 | 28 | 6 | 29 | 6 | 30 | 6 | 31 | 6 | 3 |
| 12 | 6 | 29 | 6 | 31 | 6 | 32 | 6 | 33 | 6 | 34 | 6 | 3 |
| 13 | 6 | 32 | 6 | 33 | 6 | 34 | 6 | 36 | 6 | 37 | 6 | 3 |
| 14 | 6 | 34 | 6 | 36 | 6 | 37 | 6 | 39 | 6 | 40 | 6 | 4 |
| 15 | 6 | 37 | 6 | 39 | 6 | 40 | 6 | 42 | 6 | 43 | 6 | 4 |
| 16 | 6 | 40 | 6 | 41 | 6 | 43 | 6 | 45 | 6 | 46 | 6 | 4 |
| 17 | 6 | 42 | 6 | 44 | 6 | 46 | 6 | 48 | 6 | 49 | 6 | 5 |
| 18 | 6 | 45 | 6 | 47 | 6 | 49 | 6 | 51 | 6 | 53 | 6 | 5 |
| 19 | 6 | 48 | 6 | 50 | 6 | 52 | 6 | 54 | 6 | 56 | 6 | 5 |
| 20 | 6 | 51 | 6 | 53 | 6 | 55 | 6 | 57 | 6 | 59 | 7 | 0 |
| 21 | 6 | 53 | 6 | 56 | 6 | 58 | 7 | 00 | 7 | 02 | 7 | 0 |
| 22 | 6 | 56 | 6 | 58 | 7 | 01 | 7 | 03 | 7 | 06 | 7 | 0 |
| 23 | 6 | 59 | 7 | 01 | 7 | 04 | 7 | 06 | 7 | 09 | 7 | 1 |
| 23,31 | 7 | 01 | 7 | 03 | 7 | 06 | 7 | 08 | 7 | 11 | 7 | 1 |

Degrees of Declination.

*A Table shewing the Semidiurnal-Arch, or the Time of Sun-setting, when the Sun hath North Declination; and the Seminocturnal Arch, or Time of Sun-rising, when the Sun hath South Declination.*

| Sun's Decli. | The Degrees of Latitude. | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 37 | | 38 | | 39 | | 40 | | 41 | | 42 | |
| | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 |
| 1 | 6 | 03 | 6 | 03 | 6 | 03 | 6 | 03 | 6 | 03 | 6 | 04 |
| 2 | 6 | 06 | 6 | 06 | 6 | 06 | 6 | 07 | 6 | 07 | 6 | 07 |
| 3 | 6 | 09 | 6 | 09 | 6 | 10 | 6 | 10 | 6 | 10 | 6 | 11 |
| 4 | 6 | 12 | 6 | 13 | 6 | 13 | 6 | 13 | 6 | 14 | 6 | 14 |
| 5 | 6 | 15 | 6 | 16 | 6 | 16 | 6 | 17 | 6 | 17 | 6 | 18 |
| 6 | 6 | 18 | 6 | 19 | 6 | 20 | 6 | 20 | 6 | 21 | 6 | 22 |
| 7 | 6 | 21 | 6 | 22 | 6 | 23 | 6 | 24 | 6 | 25 | 6 | 25 |
| 8 | 6 | 24 | 6 | 25 | 6 | 26 | 6 | 27 | 6 | 28 | 6 | 29 |
| 9 | 6 | 27 | 6 | 28 | 6 | 29 | 6 | 31 | 6 | 32 | 6 | 33 |
| 10 | 6 | 31 | 6 | 32 | 6 | 33 | 6 | 34 | 6 | 35 | 6 | 37 |
| 11 | 6 | 34 | 6 | 35 | 6 | 36 | 6 | 38 | 6 | 39 | 6 | 40 |
| 12 | 6 | 37 | 6 | 38 | 6 | 40 | 6 | 41 | 6 | 43 | 6 | 44 |
| 13 | 6 | 40 | 6 | 42 | 6 | 43 | 6 | 45 | 6 | 46 | 6 | 48 |
| 14 | 6 | 43 | 6 | 45 | 6 | 47 | 6 | 48 | 6 | 50 | 6 | 52 |
| 15 | 6 | 47 | 6 | 48 | 6 | 50 | 6 | 52 | 6 | 54 | 6 | 56 |
| 16 | 6 | 50 | 6 | 52 | 6 | 54 | 6 | 56 | 6 | 58 | 7 | 00 |
| 17 | 6 | 53 | 6 | 55 | 6 | 57 | 7 | 00 | 7 | 02 | 7 | 04 |
| 18 | 6 | 57 | 6 | 59 | 7 | 01 | 7 | 03 | 7 | 06 | 7 | 08 |
| 19 | 7 | 00 | 7 | 02 | 7 | 05 | 7 | 07 | 7 | 10 | 7 | 12 |
| 20 | 7 | 04 | 7 | 06 | 7 | 09 | 7 | 11 | 7 | 14 | 7 | 17 |
| 21 | 7 | 07 | 7 | 10 | 7 | 12 | 7 | 15 | 7 | 18 | 7 | 21 |
| 22 | 7 | 11 | 7 | 14 | 7 | 16 | 7 | 19 | 7 | 22 | 7 | 25 |
| 23 | 7 | 15 | 7 | 17 | 7 | 20 | 7 | 23 | 7 | 27 | 7 | 30 |
| 23,31 | 7 | 17 | 7 | 19 | 7 | 22 | 7 | 26 | 7 | 29 | 7 | 32 |

Degrees of Declination.

*A Table shewing the Semidiurnal-Arcs, or the Time of Sun-set when the Sun hath North Declination; and the Seminocturnal-Arcs, or the Time of Sun-rising, when the Sun hath South Declination.*

The Degrees of Latitude.

| Sun's Decli. | 43 | | 44 | | 45 | | 46 | | 47 | | 48 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. | |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 0 |
| 1 | 6 | 04 | 6 | 04 | 6 | 04 | 6 | 04 | 6 | 04 | 6 | 0 |
| 2 | 6 | 07 | 6 | 08 | 6 | 08 | 6 | 08 | 6 | 09 | 6 | 0 |
| 3 | 6 | 11 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 13 | 6 | 1 |
| 4 | 6 | 15 | 6 | 15 | 6 | 16 | 6 | 17 | 6 | 17 | 6 | 1 |
| 5 | 6 | 19 | 6 | 19 | 6 | 20 | 6 | 21 | 6 | 22 | 6 | 2 |
| 6 | 6 | 22 | 6 | 23 | 6 | 24 | 6 | 25 | 6 | 26 | 6 | 2 |
| 7 | 6 | 26 | 6 | 27 | 6 | 28 | 6 | 29 | 6 | 30 | 6 | 3 |
| 8 | 6 | 30 | 6 | 31 | 6 | 32 | 6 | 33 | 6 | 35 | 6 | 3 |
| 9 | 6 | 34 | 6 | 35 | 6 | 36 | 6 | 38 | 6 | 39 | 6 | 4 |
| 10 | 6 | 38 | 6 | 39 | 6 | 41 | 6 | 42 | 6 | 44 | 6 | 4 |
| 11 | 6 | 42 | 6 | 43 | 6 | 45 | 6 | 46 | 6 | 48 | 6 | 5 |
| 12 | 6 | 46 | 6 | 47 | 6 | 49 | 6 | 51 | 6 | 53 | 6 | 5 |
| 13 | 6 | 50 | 6 | 52 | 6 | 53 | 6 | 55 | 6 | 57 | 6 | 5 |
| 14 | 6 | 54 | 6 | 56 | 6 | 58 | 7 | 00 | 7 | 02 | 7 | 0 |
| 15 | 6 | 58 | 7 | 00 | 7 | 02 | 7 | 04 | 7 | 07 | 7 | 0 |
| 16 | 7 | 02 | 7 | 04 | 7 | 07 | 7 | 09 | 7 | 12 | 7 | 1 |
| 17 | 7 | 06 | 7 | 09 | 7 | 11 | 7 | 14 | 7 | 17 | 7 | 1 |
| 18 | 7 | 11 | 7 | 13 | 7 | 16 | 7 | 19 | 7 | 22 | 7 | 2 |
| 19 | 7 | 15 | 7 | 18 | 7 | 21 | 7 | 24 | 7 | 27 | 7 | 3 |
| 20 | 7 | 19 | 7 | 22 | 7 | 25 | 7 | 29 | 7 | 32 | 7 | 3 |
| 21 | 7 | 24 | 7 | 27 | 7 | 30 | 7 | 34 | 7 | 37 | 7 | 4 |
| 22 | 7 | 28 | 7 | 31 | 7 | 35 | 7 | 39 | 7 | 43 | 7 | 4 |
| 23 | 7 | 33 | 7 | 37 | 7 | 40 | 7 | 44 | 7 | 48 | 7 | 5 |
| 23,31 | 7 | 36 | 7 | 39 | 7 | 43 | 7 | 47 | 7 | 51 | 7 | 5 |

Degrees of Declination.

A Table shewing the Semidiurnal-Arch, or the Time of Sun-setting, when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-rising, when the Sun hath South Declination.

The Degrees of Latitude.

| Degrees | 49 | | 50 | | 51 | | 52 | | 53 | | 54 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 |
| 1 | 6 | 05 | 6 | 05 | 6 | 05 | 6 | 05 | 6 | 05 | 6 | 06 |
| 2 | 6 | 09 | 6 | 10 | 6 | 10 | 6 | 10 | 6 | 11 | 6 | 11 |
| 3 | 6 | 14 | 6 | 14 | 6 | 15 | 6 | 15 | 6 | 16 | 6 | 17 |
| 4 | 6 | 18 | 6 | 19 | 6 | 20 | 6 | 21 | 6 | 21 | 6 | 22 |
| 5 | 6 | 23 | 6 | 24 | 6 | 25 | 6 | 26 | 6 | 27 | 6 | 28 |
| 6 | 6 | 28 | 6 | 29 | 6 | 30 | 6 | 31 | 6 | 32 | 6 | 33 |
| 7 | 6 | 32 | 6 | 34 | 6 | 35 | 6 | 36 | 6 | 38 | 6 | 39 |
| 8 | 6 | 37 | 6 | 39 | 6 | 40 | 6 | 41 | 6 | 43 | 6 | 45 |
| 9 | 6 | 42 | 6 | 44 | 6 | 45 | 6 | 47 | 6 | 49 | 6 | 50 |
| 10 | 6 | 47 | 6 | 49 | 6 | 50 | 6 | 52 | 6 | 54 | 6 | 56 |
| 11 | 6 | 52 | 6 | 54 | 6 | 56 | 6 | 58 | 7 | 00 | 7 | 02 |
| 12 | 6 | 57 | 6 | 59 | 7 | 01 | 7 | 03 | 7 | 06 | 7 | 08 |
| 13 | 7 | 02 | 7 | 04 | 7 | 06 | 7 | 09 | 7 | 11 | 7 | 14 |
| 14 | 7 | 07 | 7 | 09 | 7 | 12 | 7 | 14 | 7 | 17 | 7 | 20 |
| 15 | 7 | 12 | 7 | 14 | 7 | 17 | 7 | 20 | 7 | 23 | 7 | 27 |
| 16 | 7 | 17 | 7 | 20 | 7 | 23 | 7 | 26 | 7 | 29 | 7 | 33 |
| 17 | 7 | 22 | 7 | 25 | 7 | 29 | 7 | 32 | 7 | 36 | 7 | 40 |
| 18 | 7 | 28 | 7 | 31 | 7 | 35 | 7 | 38 | 7 | 42 | 7 | 46 |
| 19 | 7 | 33 | 8 | 37 | 7 | 41 | 7 | 45 | 7 | 49 | 7 | 53 |
| 20 | 7 | 39 | 7 | 43 | 7 | 47 | 7 | 51 | 7 | 56 | 8 | 00 |
| 21 | 7 | 45 | 7 | 49 | 7 | 53 | 7 | 58 | 8 | 02 | 8 | 08 |
| 22 | 7 | 51 | 7 | 55 | 8 | 00 | 8 | 05 | 8 | 10 | 8 | 15 |
| 23 | 7 | 57 | 8 | 02 | 8 | 06 | 8 | 12 | 8 | 17 | 8 | 23 |
| 31 | 8 | 00 | 8 | 05 | 8 | 10 | 8 | 16 | 8 | 21 | 8 | 27 |

A Table shewing the Semidiurnal-Arch, or the Time of Sun-set when the Sun hath North Declination; and the Seminocturnal-Arch, or the Time of Sun-rising, when the Sun hath South Declination.

| Sun's Declin. Degrees of Declination. | The Degrees of Latitude. 55 | | 56 | | 57 | | 58 | | 59 | | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | H. | M. | H. | M. | H. | M. | H. | M. | H. | M. | H. |
| 0 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 | 00 | 6 |
| 1 | 6 | 06 | 6 | 06 | 6 | 06 | 6 | 06 | 6 | 07 | 6 |
| 2 | 6 | 11 | 6 | 12 | 6 | 12 | 6 | 13 | 6 | 13 | 6 |
| 3 | 6 | 17 | 6 | 18 | 6 | 19 | 6 | 19 | 6 | 20 | 6 |
| 4 | 6 | 23 | 6 | 24 | 6 | 25 | 6 | 26 | 6 | 27 | 6 |
| 5 | 6 | 29 | 6 | 30 | 6 | 31 | 6 | 32 | 6 | 33 | 6 |
| 6 | 6 | 35 | 6 | 36 | 6 | 37 | 6 | 39 | 6 | 40 | 6 |
| 7 | 6 | 40 | 6 | 42 | 6 | 44 | 6 | 45 | 6 | 47 | 6 |
| 8 | 6 | 46 | 6 | 48 | 6 | 50 | 6 | 52 | 6 | 54 | 6 |
| 9 | 6 | 52 | 6 | 54 | 6 | 56 | 6 | 59 | 7 | 01 | 7 |
| 10 | 6 | 58 | 7 | 00 | 7 | 03 | 7 | 06 | 7 | 08 | 7 |
| 11 | 7 | 04 | 7 | 07 | 7 | 10 | 7 | 13 | 7 | 16 | 7 |
| 12 | 7 | 11 | 7 | 13 | 7 | 16 | 7 | 20 | 7 | 23 | 7 |
| 13 | 7 | 17 | 7 | 20 | 7 | 23 | 7 | 27 | 7 | 30 | 7 |
| 14 | 7 | 23 | 7 | 27 | 7 | 30 | 7 | 34 | 7 | 38 | 7 |
| 15 | 7 | 30 | 7 | 34 | 7 | 38 | 7 | 42 | 7 | 46 | 7 |
| 16 | 7 | 37 | 7 | 41 | 7 | 45 | 7 | 49 | 7 | 54 | 7 |
| 17 | 7 | 44 | 7 | 48 | 7 | 52 | 7 | 57 | 8 | 03 | 8 |
| 18 | 7 | 51 | 7 | 55 | 8 | 00 | 8 | 05 | 8 | 11 | 8 |
| 19 | 7 | 58 | 8 | 03 | 8 | 08 | 8 | 14 | 8 | 20 | 8 |
| 20 | 8 | 05 | 8 | 10 | 8 | 16 | 8 | 22 | 8 | 29 | 8 |
| 21 | 8 | 13 | 8 | 19 | 8 | 25 | 8 | 32 | 8 | 39 | 8 |
| 22 | 8 | 21 | 8 | 27 | 8 | 34 | 8 | 41 | 8 | 49 | 8 |
| 23 | 8 | 29 | 8 | 36 | 8 | 43 | 8 | 51 | 9 | 00 | 9 |
| 23,31 | 8 | 34 | 8 | 41 | 8 | 48 | 8 | 56 | 9 | 05 | 9 |

# The USE of the Foregoing Tables.

*o find the Time of the Sun's Riſing and Setting, with the Length of the Day and Night, by theſe foregoing Tables of Semidiurnal and Seminocturnal-Arches.*

Irſt, ſeek the Sun's Declination in the Tables of Declination for your Day propoſed, with which enter the foregoing Table of Semi-rnal and Seminocturnal-Arches, finding the Ele-ion of the Pole, or Latitude of the Place, in the d of the Table, and the Degree of the Sun's Decli-ion in the firſt Column on the left hand; and in common Angle of Meeting you will find the Se-diurnal-Arch, if the Sun hath North Declination; the Seminocturnal-Arch, if the Sun hath South clination.

*Example* 1.

For Illuſtration hereof, let it be required to find Time of the Sun's Riſing and Setting, with the gth of the Day and Night for the 23*d* day of *ril* 1692, in Latitude 46 deg. North.

At which time the Sun's Declination is 16 deg. in. North, with which I enter the Table, as be-e is declared, and I find the Semidiurnal-Arch to be

be 7 hours 9 min. which is the true Time of Sun-
ting, whose Complement to 12 hours, is the S
nocturnal-Arch, or the Time of Sun-rising, whi
4 hours 51 min. If you double the Semidiurnal-A
you will have the Length of the Day; and if
double the Seminocturnal-Arch, the Aggregate
yield you the Length of the Night. See the W
following.

| | H. | M. |
|---|---|---|
| The Semidiurnal-Arch, or Time of Sun-setting | 12 | 00 |
| | 07 | 09 |
| The Complement to 12 hours | 04 | 51 |
| Which is the Seminocturnal-Arch, or Time of Sun-rising, Latitude 46 Degrees. | | |
| The Semidiurnal-Arch doubled | 07 | 09 |
| | 07 | 09 |
| The Length of the Day, *Apr.* 23. 1692. | 14 | 18 |
| The Seminocturnal-Arch doubled, | 04 | 51 |
| | 04 | 51 |
| The Length of the Night, *April* 23. 1692. | 09 | 42 |

*Example* 2.

But when the Sun hath 16 deg. 1 min. South
clination in this Latitude of 46 deg.

Then the Day Arch will be equal to the N
Arch, and the Night Arch will be equal to the
Arch.

As on *October* 26, 1692. the Sun hath 16
2 min. South Declination, then the Time of the
rising will be at 7 hours 9 min. his Setting at 4
51

51 min. the length of the Day will be 9 hours 42 min. and the length of the Night 14 hours 18 min.

*Example* 3.

Let it be required to find the Time of the Sun's Rising and Setting, with the length of the Day and Night, for the 15*th* Day of *December* 1693. in Latitude 53 deg. North; at which time the Sun's Declination is 23 deg. 27 min. South.

| | H. | M. |
|---|---|---|
| The Seminocturnal-Arch, or the Time of Sun-rising | 12 00 − 08 21 | |
| The Complement to 12 houts | 03 | 39 |
| Which is the Semidiurnal-Arch, or Time of Sun-setting. | | |
| The Semidiurnal-Arch doubled | 03 39 + 03 39 | |
| Length of the Day, *Dec.* 15. 1693. | 07 | 18 |
| The Seminocturnal-Arch doubled | 08 21 + 08 21 | |
| The Length of the Night, *Decemb.* 15, 1693. | 16 | 42 |

These Tables will serve as well in South Latitude as they will in North, without any Alteration; only this is to be considered; When you are in South Latitude, you must then use your South Declination here, as you do your North Declination here.

For then these Tables shew the Semidiurnal-Arch, or the Time of Sun-setting, when the Sun hath South Declination; and the Seminocturnal-Arch, or the Time of Sun-setting, when the Sun hath North Declination.

*Example*

*Example* 4.

Let it be required to find the Time of the Sun's Rising and Setting, with the Length of the Day and Night, for the 23*d* Day of *April* 1692. in Latitude 46 deg. South.

At which Time the Sun's Declination is 11 deg. 1 min. North, with which I enter the Table, and find the Seminocturnal-Arch to be 7 hours 9 min. which is the true Time of Sun-rising, whose Complement to 12 hours, is the Semidiurnal-Arch, or the Time of Sun-setting, which is at 51 min. past 4 of the Clock.

| | H. | M. |
|---|---|---|
| The Seminocturnal-Arch doubled — | 12 | 00 |
| | 07 | 09 |
| | 07 | 09 |
| The Length of the Night, *April* 23. 1692. Latitude 46 deg. South — | 14 | 18 |
| The Semidiurnal-Arch doubled — | 04 | 51 |
| | 04 | 51 |
| The Length of the Day for the 23*d* of *April* 1692. Latitude 46 deg. South, | 09 | 42 |

*Example* 5.

Let it be required to find the Time of the Sun's Rising and Setting, with the Length of the Day and Night, for the 15*th* Day of *December* 1693. in Latitude 53 deg. South.

At which Time the Sun's Declination is 23 deg. 27 min. South; with which enter the Table of Semidiurnal-Arches, *&c.* and you will find as follows.

| | H. | M. |
|---|---|---|
| The Semidiurnal-Arch, or Time of Sun-setting | 12 | 00 |
| | 08 | 21 |
| The Seminocturnal-Arch, or the Time of Sun-rising, | 03 | 39 |
| The Length of the Day, | 16 | 42 |
| Length of the Night, *Dec.* 15. 1693. Latitude 53 degrees South, | 07 | 18 |

*To find the time of a Star's Rising or Setting.*

BY these Tables you may find the time of the *Rising* and *Setting* of all the *fixed Stars* in the Heavens, whose Declinations do not exceed the Sun's greatest Declination, in any Latitude that the Tables contain, and at any time of the Year, in this manner;

If the Star hath North Declination, and you in North Latitude, look for your Latitude in the head of the Table, the Declination on the left hand; and in the common Angle of meeting, you will find your Star's Semidiurnal-Arch, or half the time that Star doth continue above the Horizon in that Latitude; or the Distance of time that Star is in going from the Horizon to the Meridian on the Eastside; likewise from the Meridian to the Horizon on the Westside of the Meridian.

Now if you subtract these Hours and Minutes aforesaid, from the time of the Star's coming to the Meridian, the Remainder will be the time of the Star's

Star's Rising; and if you add, the Sum will be true time of the Star's setting.

*Example 6.*

Let it be required to find the time of the Rising and Setting of the *Bull's-Eye*, *Novemb.* 18. in Latitude of 42 deg. North; the Declination of Star is 15 deg. 47 min. North; the 18*th* Day *November* this Star cometh on the Meridian at Clock at Night.

| | H. |
|---|---|
| The time of the Star's Southing | 12 |
| The Semidiurnal-Arch, subtract | 06 |
| Time of the Star's Rising in the Evening, | 05 |
| Time of the Star's Setting in the Morning, | 06 |

*Note* 1. If the Sum of your Addition exceed hours, you must cast away 12 hours.

2. And when you can't subtract, add 12 hours the Star's Southing, and then subtract, what rem is its Setting.

*Example 7.*

I desire to know the time of the Rising and ting of the *Bull's-Eye* the 18*th* Day of *November*, the Latitude of 13 deg. North, the Declinatio the *Bull's-Eye* is 15 deg. 47 min. North.

| | H. | M. |
|---|---|---|
| e Time of its Southing | 12 | 00 |
| e Semidiurnal-Arch, ſubtract | 06 | 15 |
| e Time of his Riſing in the Evening, | 05 | 45 |
| e Time of his Setting in the Morning, | 06 | 15 |

f your Star hath South Declination, and you in rth Latitude, look as before the Latitude in the d of the Table, the Declination on the left ſide, in the common Angle of meeting you will find *Star's Seminocturnal-Arch*, which ſubtract from hours, the Remainder is the *Star's Semidiurnal-*, or half the Time that Star doth continue a- the Horizon in that Latitude: therefore if you ract thoſe hours and minutes aboveſaid, from Time of the Star's coming to the Meridian, ing 12 hours to the Star's Southing, if other- Subtraction cannot be made) the Remainder be the Time of the Star's Riſing; and if you the Sum will be the Time of the Star's Set-

*Example* 8.

et it be required to find the Time of the Riſing Setting of the bright Star in the *Great Dog's* , the 15*th* Day of *November*, in the Latitude d. North. The Declination of the *Great Dog's* , is 16 d. 15 m. South.

| | H. |
|---|---|
| The Time of this Star's Southing, | 02 |
| To it add | 12 |
| The Sum is | 14 |
| The Seminocturnal-Arch, by the Table, is | 07 |
| Which ſubtract from | 12 |
| The Remainder is the Semidiurnal-Arch, | 04 |
| Time of Southing, with 12 hours added, is | 14 |
| The Semidiurnal-Arch, ſubtract | 04 |
| Time of the Star's Riſing in the Evening, | 09 |
| Time of the Star's Setting in the Morning, | 07 |

*Example 9.*

I deſire to know the Riſing and Setting of *Great Dog*, and for the 15*th* of *November*, as ſaid, in the Latitude of 33 degrees North.

| | H. |
|---|---|
| Time of Southing, with 12 hours added, | 14 |
| The Semidiurnal-Arch, | 05 |
| Time of the Star's Riſing in the Evening, | 09 |
| Time of the Star's Setting in the Morning, | 07 |

*In South Latitude, to know the Time of the Riſing and Setting of the Stars.*

DO with thoſe Stars that have North Declination, in South Latitude, as with Stars that have South Declination, when in North Latitude.

*Example* 10.

To illuſtrate this, Let it be required to find the true Time of Riſing and Setting of the *Bulls-Eye* the 18th Day of *November*, in the Latitude of 42 deg. South.

The Declination of this Star is 15 deg. 47 min. North; the 18th Day of *November* this Star comes upon the Meridian at 12 of the Clock at Night.

| | H. | M. |
|---|---|---|
| The Seminoctiurnal-Arch, by the Table, is— | 06 | 59 |
| Which ſubtract from ——— | 12 | 00 |
| The Remainder is the Semidiurnal-Arch, — | 05 | 01 |
| The Time of the Star's Northing is——— | 12 | 00 |
| The Semidiurnal-Arch, add——— | 05 | 01 |
| Time of the Star's Riſing in the Evening,— | 06 | 59 |
| Time of the Star's Setting in the Morning,-- | 05 | 01 |

In like manner may the Riſing and Setting of any Star, (whoſe Declination exceedeth not the Sun's greateſt) be found in any Latitude, from the Equinoctial to 60 Degrees.

# ASTRONOMICAL
# TABLE
## SHEWING

The Point of the *Compaſs* that the
and *Stars* Riſe and Set with.

Being of excellent Uſe for the ready fin
of the *Variation of the Compaſs*: and
be performed by an ordinary *Mer*
*Compaſs*, but more exactly by an *Azi*
*Compaſs*.

Fitting all Parts of the World, wher
Pole is elevated not above 60 deg.
*North* or *South*.

## Latitude 0 Degree.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.49 | 1 | |
| 2 | | 5.37 | 2 | |
| 3 | | 8.26 | 3 | |
| e by n | w by n | 11.15 | e by s | w by s |
| 1 | | 14. 4 | 1 | |
| 2 | | 16.52 | 2 | |
| 3 | | 19.41 | 3 | |
| e n e | w n w | 22.30 | e s e | w s w |

## Latitude 1 Degree.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.49 | 1 | |
| 2 | | 5.37 | 2 | |
| 3 | | 8.26 | 3 | |
| e by n | w by n | 11.15 | e by s | w by s |
| 1 | | 14. 4 | 1 | |
| 2 | | 16.52 | 2 | |
| 3 | | 19.41 | 3 | |
| e n e | w n w | 22.30 | e s e | w s w |

## Latitude 2 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.49 | 1 | |
| 2 | | 5.37 | 2 | |
| 3 | | 8.26 | 3 | |
| e by n | w by n | 11.14 | e by s | w by s |
| 1 | | 14. 3 | 1 | |
| 2 | | 16.51 | 2 | |
| 3 | | 19.40 | 3 | |
| e n e | w n w | 22.29 | e s e | w s w |

## Latitude 3 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.49 | 1 | |
| 2 | | 5.37 | 2 | |
| 3 | | 8.25 | 3 | |
| e by n | w by n | 11.14 | e by s | w by s |
| 1 | | 14. 3 | 1 | |
| 2 | | 16.51 | 2 | |
| 3 | | 19.39 | 3 | |
| e n e | w n w | 22.27 | e s e | w s w |

| Latitude 4 Degrees. | | | | | Latitude 5 Degrees. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *North Declination.* | | *Declination.* | *South Declination.* | | *North Declination.* | | *Declination.* | *South Declination.* | |
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* | ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* |
| East | Weſt | 0. 0 | East | Weſt | East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.48 | 1 | | 1 | | 2.48 | 1 | |
| 2 | | 5.37 | 2 | | 2 | | 5.37 | 2 | |
| 3 | | 8.25 | 3 | | 3 | | 8.24 | 3 | |
| e *by* n | w *by* n | 11.14 | e *by* s | w *by* s | e *by* n | w *by* n | 11.12 | e *by* s | w *by* s |
| 1 | | 14.02 | 1 | | 1 | | 14.01 | 1 | |
| 2 | | 16.50 | 2 | | 2 | | 16.49 | 2 | |
| 3 | | 19.38 | 3 | | 3 | | 19.36 | 3 | |
| e n e | w n w | 22.26 | e s e | w s w | e n e | w n w | 22.23 | e s e | w s w |

| Latitude 6 Degrees. | | | | | Latitude 7 Degrees. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *North Declination.* | | *Declination.* | *South Declination.* | | *North Declination.* | | *Declination.* | *South Declination.* | |
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* | ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* |
| East | Weſt | 0. 0 | East | Weſt | East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.48 | 1 | | 1 | | 2.48 | 1 | |
| 2 | | 5.36 | 2 | | 2 | | 5.35 | 2 | |
| 3 | | 8.23 | 3 | | 3 | | 8.20 | 3 | |
| e *by* n | w *by* n | 11.11 | e *by* s | w *by* s | e *by* n | w *by* n | 11. 9 | e *by* s | w |
| 1 | | 13.59 | 1 | | 1 | | 13.58 | 1 | |
| 2 | | 16.47 | 2 | | 2 | | 16.45 | 2 | |
| 3 | | 19.23 | 3 | | 3 | | 19.31 | 3 | |
| e n e | w n w | 22.21 | e s e | w s w | e n e | w n w | 22.19 | e s e | |

## Latitude 8 Degrees.

| *North Declination.* ⊙*rise* | ⊙*set* | *Declination.* D. M. | *South Declination.* ⊙*rise* | ⊙*set* |
|---|---|---|---|---|
| East | West | 0. 0 | East | West |
| 1 | | 2.47 | 1 | |
| 2 | | 5.35 | 2 | |
| 3 | | 8.18 | 3 | |
| e *by* n | w *by* n | 11. 8 | e *by* s | w *by* s |
| 1 | | 13.56 | 1 | |
| 2 | | 16.43 | 2 | |
| 3 | | 19.28 | 3 | |
| ene | wnw | 22.15 | ese | wsw |

## Latitude 9 Degrees.

| *North Declination.* ⊙*rise* | ⊙*set* | *Declination.* D. M. | *South Declination.* ⊙*rise* | ⊙*set* |
|---|---|---|---|---|
| East | West | 0. 0 | East | West |
| 1 | | 2.47 | 1 | |
| 2 | | 5.34 | 2 | |
| 3 | | 8.17 | 3 | |
| e *by* n | w *by* n | 11. 6 | e *by* s | w *by* s |
| 1 | | 13.53 | 1 | |
| 2 | | 16.40 | 2 | |
| 3 | | 19.25 | 3 | |
| ene | wnw | 22.12 | ese | wsw |

## Latitude 10 Degrees.

| *North Declination.* ⊙*rise* | ⊙*set* | *Declination.* D. M. | *South Declination.* ⊙*rise* | ⊙*set* |
|---|---|---|---|---|
| East | West | 0. 0 | East | West |
| 1 | | 2.47 | 1 | |
| 2 | | 5.33 | 2 | |
| 3 | | 8.16 | 3 | |
| e *by* n | w *by* n | 11. 5 | e *by* s | w *by* s |
| 1 | | 13.51 | 1 | |
| 2 | | 16.37 | 2 | |
| 3 | | 19.21 | 3 | |
| ene | wnw | 22. 7 | ese | wsw |

## Latitude 11 Degrees.

| *North Declination.* ⊙*rise* | ⊙*set* | *Declination.* D. M. | *South Declination.* ⊙*rise* | ⊙*set* |
|---|---|---|---|---|
| East | West | 0. 0 | East | West |
| 1 | | 2.46 | 1 | |
| 2 | | 5.31 | 2 | |
| 3 | | 8.14 | 3 | |
| e *by* n | w *by* n | 11. 3 | e *by* s | w *by* s |
| 1 | | 13.48 | 1 | |
| 2 | | 16.33 | 2 | |
| 3 | | 19.18 | 3 | |
| ene | wnw | 22. 3 | ese | wsw |

## Latitude 12 Degrees.

| *North Declination.* | | *Declination.* | *South Declination.* | |
|---|---|---|---|---|
| ☉*riſe* | ☉*ſet* | D. M. | ☉*riſe* | ☉*ſet* |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.45 | 1 | |
| 2 | | 5.30 | 2 | |
| 3 | | 8.12 | 3 | |
| e *by* n w *by* n | | 11. 0 | e *by* s w *bys* | |
| 1 | | 13.45 | 1 | |
| 2 | | 16.30 | 2 | |
| 3 | | 19.14 | 3 | |
| ene | wnw | 21.58 | ese | wsw |

## Latitude 13 Degrees.

| *North Declination.* | | *Declination.* | *South Declination.* | |
|---|---|---|---|---|
| ☉*riſe* | ☉*ſet* | D. M. | ☉*riſe* | ☉*ſet* |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.45 | 1 | |
| 2 | | 5.29 | 2 | |
| 3 | | 8.10 | 3 | |
| e *by* n w *by* n | | 11.57 | e *by* s w | |
| 1 | | 13.42 | 1 | |
| 2 | | 16.26 | 2 | |
| 3 | | 19. 9 | 3 | |
| ene | wnw | 21.53 | ese | |

## Latitude 14 Degrees.

| *North Declination.* | | *Declination.* | *South Declination.* | |
|---|---|---|---|---|
| ☉*riſe* | ☉*ſet* | D. M. | ☉*riſe* | ☉*ſet* |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.44 | 1 | |
| 2 | | 5.28 | 2 | |
| 3 | | 8. 8 | 3 | |
| e *by* n w *by* n | | 10.55 | e *by* s w *bys* | |
| 1 | | 13.38 | 1 | |
| 2 | | 16.22 | 2 | |
| 3 | | 19. 4 | 3 | |
| ene | wnw | 21.47 | ese | wsw |

## Latitude 15 Degrees.

| *North Declination.* | | *Declination.* | *South Declination.* | |
|---|---|---|---|---|
| ☉*riſe* | ☉*ſet* | D. M. | ☉*riſe* | ☉*ſet* |
| East | Weſt | 0. 0 | East | |
| 1 | | 2.43 | 1 | |
| 2 | | 5.26 | 2 | |
| 3 | | 8. 6 | 3 | |
| e *by* n w *by* n | | 10.52 | e *by* s | |
| 1 | | 13.35 | 1 | |
| 2 | | 16.17 | 2 | |
| 3 | | 18.59 | 3 | |
| ene | wnw | 21.41 | ese | |

## Latitude 16 Degrees.

| North Declination. | Decli-nation. | South Declination. | |
|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| eaſt | Weſt | 0. 0 | Eaſt | Weſt |
| 1 | | 2.42 | 1 | |
| 2 | | 5.25 | 2 | |
| 3 | | 8. 3 | 3 | |
| e by n | w by n | 10.49 | e by s | w by s |
| 1 | | 13.31 | 1 | |
| 2 | | 16,12 | 2 | |
| 3 | | 18.53 | 3 | |
| ene | wnw | 21.34 | ese | wsw |

## Latitude 17 Degrees.

| North Declination. | Decli-nation. | South Declination. | |
|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| Eaſt | Weſt | 0. 0 | Eaſt | Weſt |
| | 1 | 2.42 | 1 | |
| | 2 | 5.23 | 2 | |
| | 3 | 8. 1 | 3 | |
| e by n | w by n | 10.45 | e by s | w by s |
| | 1 | 13.26 | 1 | |
| | 2 | 16.08 | 2 | |
| | 3 | 18.47 | 3 | |
| ene | wnw | 21.27 | ese | wsw |

## Latitude 18 Degrees.

| North Declination. | Decli-nation. | South Declination. | |
|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| aſt | Weſt | 0. 0 | Eaſt | Weſt |
| 1 | | 2.41 | 1 | |
| 2 | | 5.22 | 2 | |
| 3 | | 7.59 | 3 | |
| e by n | w by n | 10.42 | e by s | w by s |
| 1 | | 13.22 | 1 | |
| 2 | | 16. 2 | 2 | |
| 3 | | 18.40 | 3 | |
| ene | wnw | 21.20 | ese | wsw |

## Latitude 19 Degrees.

| North Declination. | Decli-nation. | South Declination. | |
|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| East | Weſt | 0. 0 | East | Weſt |
| | 1 | 2.40 | 1 | |
| | 2 | 5.20 | 2 | |
| | 3 | 7.56 | 3 | |
| e by n | w by n | 10.38 | e by s | w by s |
| | 1 | 13.17 | 1 | |
| | 2 | 15.56 | 2 | |
| | 3 | 18.33 | 3 | |
| ene | wnw | 21.13 | ese | wsw |

## Latitude 20 Degrees.

| *North Declination.* | | *Declination.* | *South Declination.* | |
|---|---|---|---|---|
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.39 | 1 | |
| 2 | | 5.17 | 2 | |
| 3 | | 7.52 | 3 | |
| e *by* n | w *by* n | 10.34 | e *by* s | w *by* s |
| 1 | | 13.12 | 1 | |
| 2 | | 15.51 | 2 | |
| 3 | | 18.27 | 3 | |
| ene | wnw | 21. 5 | ese | wsw |

## Latitude 21 Degrees.

| *North Declination.* | | *Declination.* | *South Declination.* | |
|---|---|---|---|---|
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.38 | 1 | |
| 2 | | 5.15 | 2 | |
| 3 | | 7.50 | 3 | |
| e *by* n | w *by* n | 10.30 | e *by* s | w *by* s |
| 1 | | 13. 7 | 1 | |
| 2 | | 15.44 | 2 | |
| 3 | | 18.19 | 3 | |
| ene | wnw | 20.55 | ese | wsw |
| 1 | | 23.32 | 1 | |

## Latitude 22 Degrees.

| *North Declination.* | | *Declination.* | *South Declination.* | |
|---|---|---|---|---|
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.37 | 1 | |
| 2 | | 5.13 | 2 | |
| 3 | | 7.47 | 3 | |
| e *by* n | w *by* n | 10.25 | e *by* s | w *by* s |
| 1 | | 13. 1 | 1 | |
| 2 | | 15.38 | 2 | |
| 3 | | 18.11 | 3 | |
| ene | wnw | 20.46 | ese | wsw |
| 1 | | 23.22 | 1 | |

## Latitude 23 Degrees.

| *North Declination.* | | *Declination.* | *South Declination.* | |
|---|---|---|---|---|
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2.36 | 1 | |
| 2 | | 5.11 | 2 | |
| 3 | | 7.43 | 3 | |
| e *by* n | w *by* n | 10.21 | e *by* s | w *by* s |
| 1 | | 12.56 | 1 | |
| 2 | | 15.31 | 2 | |
| 3 | | 18. 3 | 3 | |
| ene | wnw | 20.37 | ese | wsw |
| 1 | | 23.11 | 1 | |

## Latitude 24 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.35 | 1 | |
| 2 | | 5. 9 | 2 | |
| 3 | | 7.39 | 3 | |
| e by n | w by n | 10.16 | e by s | w by s |
| 1 | | 12.50 | 1 | |
| 2 | | 15.23 | 2 | |
| 3 | | 17.54 | 3 | |
| ene | wnw | 20.28 | ese | wsw |
| 1 | | 23. 0 | 1 | |

## Latitude 25 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.33 | 1 | |
| 2 | | 5. 6 | 2 | |
| 3 | | 7.35 | 3 | |
| e by n | w by n | 10.11 | e by s | w by s |
| 1 | | 12.43 | 1 | |
| 2 | | 15.16 | 2 | |
| 3 | | 17.46 | 3 | |
| ene | wnw | 20.18 | ese | wsw |
| 1 | | 22.48 | 1 | |

## Latitude 26 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.32 | 1 | |
| 2 | | 5. 4 | 2 | |
| 3 | | 7.32 | 3 | |
| e by n | w by n | 10. 6 | e by s | w by s |
| 1 | | 12.35 | 1 | |
| 2 | | 15. 8 | 2 | |
| 3 | | 17.37 | 3 | |
| ene | wnw | 20. 7 | ese | wsw |
| 1 | | 22.36 | 1 | |

## Latitude 27 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.31 | 1 | |
| 2 | | 5. 1 | 2 | |
| 3 | | 7.28 | 3 | |
| e by n | w by n | 10. 1 | e by s | w by s |
| 1 | | 12.30 | 1 | |
| 2 | | 15. 0 | 2 | |
| 3 | | 17.28 | 3 | |
| ene | wnw | 19.56 | ese | wsw |
| 1 | | 22.23 | 1 | |

| Latitude 28 Degrees. | | | | Latitude 29 Degr | | | |
|---|---|---|---|---|---|---|---|
| *North Declination.* | | *Declination.* | *South Declination.* | *North Declination.* | | *Declination.* | *South* |
| ⊙ *riſe* | ⊙ *ſet* | D. M. | ⊙ *riſe* ⊙ *ſet* | ⊙ *riſe* | ⊙ *ſet* | D. M. | ⊙ *riſe* |
| East | Weſt | 0. 0 | East Weſt | East | Weſt | 0. 0 | East |
| 1 | | 2.29 | 1 | 1 | | 2.28 | |
| 2 | | 4.58 | 2 | 2 | | 4.55 | |
| 3 | | 7.24 | 3 | 3 | | 7.20 | |
| e *by* n | w *by* n | 9.55 | e *by* s w *by* s | e *by* n | w *by* n | 9.50 | e *by* s |
| 1 | | 12.24 | 1 | 1 | | 12.17 | |
| 2 | | 14.51 | 2 | 2 | | 14.43 | |
| 3 | | 17.17 | 3 | 3 | | 17. 7 | |
| ene | wnw | 19.45 | ese wsw | ene | wnw | 19.33 | ese |
| 1 | | 22.11 | 1 | 1 | | 21.58 | |

| Latitude 30 Degrees. | | | | Latitude 31 Degr | | | |
|---|---|---|---|---|---|---|---|
| *North Declination.* | | *Declination.* | *South Declination.* | *North Declination.* | | *Declination.* | *South* |
| ⊙ *riſe* | ⊙ *ſet* | D. M. | ⊙ *riſe* ⊙ *ſet* | ⊙ *riſe* | ⊙ *ſet* | D. M. | ⊙ *riſe* |
| East | Weſt | 0. 0 | East Weſt | East | Weſt | 0. 0 | East |
| 1 | | 2.27 | 1 | 1 | | 2.25 | |
| 2 | | 4.52 | 2 | 2 | | 4.50 | |
| 3 | | 7.18 | 3 | 3 | | 7.13 | |
| e *by* n | w *by* n | 9.44 | e *by* s w *by* s | e *by* n | w *by* n | 9.38 | e *by* s |
| 1 | | 12. 9 | 1 | 1 | | 12. 1 | |
| 2 | | 14.34 | 2 | 2 | | 14.25 | |
| 3 | | 16.57 | 3 | 3 | | 16.47 | |
| ene | wnw | 19.21 | ese wsw | ene | wnw | 19. 9 | ese |
| 1 | | 21.44 | 1 | 1 | | 21.30 | |

## Latitude 32 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| Eaſt | Weſt | 0. 0 | Eaſt | Weſt |
| 1 | | 2.23 | 1 | |
| 2 | | 4.46 | 2 | |
| 3 | | 7. 8 | 3 | |
| e by n | w by n | 9.31 | e by s | w by s |
| 1 | | 11.54 | 1 | |
| 2 | | 14.16 | 2 | |
| 3 | | 16.36 | 3 | |
| ene | wnw | 18.55 | ese | wsw |
| 1 | | 21.16 | 1 | |

## Latitude 33 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| Eaſt | Weſt | 0. 0 | Eaſt | Weſt |
| 1 | | 2.22 | 1 | |
| 2 | | 4.43 | 2 | |
| 3 | | 7. 4 | 3 | |
| e by n | w by n | 9.25 | e by s | w by s |
| 1 | | 11.46 | 1 | |
| 2 | | 14. 6 | 2 | |
| 3 | | 16.24 | 3 | |
| ene | wnw | 18.43 | ese | wsw |
| 1 | | 21. 1 | 1 | |
| 2 | | 23.18 | 2 | |

## Latitude 34 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| Eaſt | Weſt | 0. 0 | Eaſt | Weſt |
| 1 | | 2.20 | 1 | |
| 2 | | 4.40 | 2 | |
| 3 | | 6.59 | 3 | |
| e by n | w by n | 9.18 | e by s | w by s |
| 1 | | 11.38 | 1 | |
| 2 | | 13.56 | 2 | |
| 3 | | 16.12 | 3 | |
| ene | wnw | 18.30 | ese | wsw |
| 1 | | 20.46 | 1 | |
| 2 | | 23. 1 | 2 | |

## Latitude 35 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| Eaſt | Weſt | 0. 0 | Eaſt | Weſt |
| 1 | | 2.18 | 1 | |
| 2 | | 4.37 | 2 | |
| 3 | | 6.54 | 3 | |
| e by n | w by n | 9.12 | e by s | w by s |
| 1 | | 11.29 | 1 | |
| 2 | | 13.46 | 2 | |
| 3 | | 16. 2 | 3 | |
| ene | wnw | 18.16 | ese | wsw |
| 1 | | 20.30 | 1 | |
| 2 | | 22.43 | 2 | |

## Latitude 36 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.16 | 1 | |
| 2 | | 4.33 | 2 | |
| 3 | | 6.49 | 3 | |
| e by n | w by n | 9.05 | e by s | w by s |
| 1 | | 11.21 | 1 | |
| 2 | | 13.35 | 2 | |
| 3 | | 15.49 | 3 | |
| ene | wnw | 18. 2 | ese | wsw |
| 1 | | 20.15 | 1 | |
| 2 | | 22.25 | 2 | |

## Latitude 37 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.15 | 1 | |
| 2 | | 4.30 | 2 | |
| 3 | | 6.43 | 3 | |
| e by n | w by n | 8.58 | e by s | w by s |
| 1 | | 11.12 | 1 | |
| 2 | | 13.25 | 2 | |
| 3 | | 15.36 | 3 | |
| ene | wnw | 17.48 | ese | wsw |
| 1 | | 19.58 | 1 | |
| 2 | | 22. 7 | 2 | |

## Latitude 38 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.13 | 1 | |
| 2 | | 4.26 | 2 | |
| 3 | | 6.38 | 3 | |
| e by n | w by n | 8.50 | e by s | w by s |
| 1 | | 11. 3 | 1 | |
| 2 | | 13.14 | 2 | |
| 3 | | 15.23 | 3 | |
| ene | wnw | 17.33 | ese | wsw |
| 1 | | 19.41 | 1 | |
| 2 | | 21.49 | 2 | |

## Latitude 39 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙rise | ⊙set | D. M. | ⊙rise | ⊙set |
| East | West | 0. 0 | East | West |
| 1 | | 2.11 | 1 | |
| 2 | | 4.22 | 2 | |
| 3 | | 6.32 | 3 | |
| e by n | w by n | 8.43 | e by s | w by s |
| 1 | | 10.53 | 1 | |
| 2 | | 13. 3 | 2 | |
| 3 | | 15.10 | 3 | |
| ene | wnw | 17.18 | ese | wsw |
| 1 | | 19.25 | 1 | |
| 2 | | 21.30 | 2 | |
| 3 | | 23.32 | 3 | |

## Latitude 40 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2. 9 | 1 | |
| 2 | | 4.19 | 2 | |
| 3 | | 6.27 | 3 | |
| e *by* n | w *by* n | 8.36 | e *by* s | w *by* s |
| 1 | | 10.43 | 1 | |
| 2 | | 12.51 | 2 | |
| 3 | | 14.57 | 3 | |
| ene | wnw | 17. 3 | ese | wsw |
| 1 | | 19. 7 | 1 | |
| 2 | | 21.10 | 2 | |
| 3 | | 23.11 | 3 | |

## Latitude 41 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2. 7 | 1 | |
| 2 | | 4.15 | 2 | |
| 3 | | 6.22 | 3 | |
| e *by* n | w *by* n | 8.28 | e *by* s | w *by* s |
| 1 | | 10.34 | 1 | |
| 2 | | 12.40 | 2 | |
| 3 | | 14.44 | 3 | |
| ene | wnw | 16.47 | ese | wsw |
| 1 | | 18.50 | 1 | |
| 2 | | 20.51 | 2 | |
| 3 | | 22.50 | 3 | |

## Latitude 42 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D M. | ⊙riſe | ⊙ſet |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2. 6 | 1 | |
| 2 | | 4.11 | 2 | |
| 3 | | 6.16 | 3 | |
| e *by* n | w *by* n | 8.20 | e *by* s | w *by* s |
| 1 | | 10.24 | 1 | |
| 2 | | 12.28 | 2 | |
| 3 | | 14.30 | 3 | |
| ene | wnw | 16.31 | ese | wsw |
| 1 | | 18.32 | 1 | |
| 2 | | 20.31 | 2 | |
| 3 | | 22.27 | 3 | |

## Latitude 43 Degrees.

| North Declination. | | Declination. | South Declination. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2. 4 | 1 | |
| 2 | | 4. 7 | 2 | |
| 3 | | 6.10 | 3 | |
| e *by* n | w *by* n | 8.12 | e *by* s | w *by* s |
| 1 | | 10.14 | 1 | |
| 2 | | 12.16 | 2 | |
| 3 | | 14.16 | 3 | |
| ene | wnw | 16.15 | ese | wsw |
| 1 | | 18.14 | 1 | |
| 2 | | 20.10 | 2 | |
| 3 | | 22. 5 | 3 | |

| Latitude 44 Degrees. | | | | | Latitude 45 Degrees. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *North Declination.* | | *Declination.* | *South Declination.* | | *North Declination.* | | *Declination.* | *South Declination.* | |
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* | ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* |
| East | Weſt | 0. 0 | East | Weſt | East | Weſt | 0. 0 | East | Weſt |
| 1 | | 2. 1 | 1 | | 1 | | 2. 0 | 1 | |
| 2 | | 4. 3 | 2 | | 2 | | 3.59 | 2 | |
| 3 | | 6. 4 | 3 | | 3 | | 5.57 | 3 | |
| e *by* n | w *by* n | 8. 4 | e *by* s | w *by* s | e *by* n | w *by* n | 7.56 | e *by* s | w *by* s |
| 1 | | 10. 4 | 1 | | 1 | | 9.54 | 1 | |
| 2 | | 12. 3 | 2 | | 2 | | 11.51 | 2 | |
| 3 | | 14. 1 | 3 | | 3 | | 13.46 | 3 | |
| ene | wnw | 15.59 | ese | wsw | ene | wnw | 15.42 | ese | wsw |
| 1 | | 17.54 | 1 | | 1 | | 17.36 | 1 | |
| 2 | | 19.50 | 2 | | 2 | | 19.30 | 2 | |
| 3 | | 21.42 | 3 | | 3 | | 21.19 | 3 | |
| nebe | nwbw | 23.32 | sebe | s *bw* | nebe | nwbw | 23. 8 | sebe | swbw |

| Latitude 46 Degrees. | | | | | Latitude 47 Degrees. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *North Declination.* | | *Declination.* | *South Declination.* | | *North Declination.* | | *Declination.* | *South Declination.* | |
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* | ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* | ⊙*ſet* |
| East | Weſt | 0. 0 | East | Weſt | East | Weſt | 0. 0 | East | Weſt |
| 1 | | 1.58 | 1 | | 1 | | 1.55 | 1 | |
| 2 | | 3.55 | 2 | | 2 | | 3.50 | 2 | |
| 3 | | 5.51 | 3 | | 3 | | 5.45 | 3 | |
| e *by* n | w *by* n | 7.47 | e *by* s | w *by* s | e *by* n | w *by* n | 7.39 | e *by* s | w *by* s |
| 1 | | 9.43 | 1 | | 1 | | 9.33 | 1 | |
| 2 | | 11.38 | 2 | | 2 | | 11.25 | 2 | |
| 3 | | 13.32 | 3 | | 3 | | 13.17 | 3 | |
| ene | wnw | 15.25 | ese | wsw | ene | wnw | 15. 8 | ese | wsw |
| 1 | | 17.17 | 1 | | 1 | | 16.57 | 1 | |
| 2 | | 19. 7 | 2 | | 2 | | 18.46 | 2 | |
| 3 | | 20.55 | 3 | | 3 | | 20.31 | 3 | |
| nebe | nwbw | 22.42 | sebe | swbw | nebe | nwbw | 22.16 | sebe | swbw |

## Latitude 48 Degrees.

| North Decli-nation. | | Decli-nation. | South Decli-nation. | |
|---|---|---|---|---|
| ⊙ſet | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| Eaſt | Weſt | 0. 0 | Eaſt | Weſt |
| 1 | | 1.53 | 1 | |
| 2 | | 3.46 | 2 | |
| 3 | | 5.38 | 3 | |
| *by n w by n* | | 7.30 | *e by s* | *w by s* |
| 1 | | 9.22 | 1 | |
| 2 | | 11.12 | 2 | |
| 3 | | 13. 1 | 3 | |
| *ne w n w* | | 14.50 | *e s e* | *w s w* |
| 1 | | 16.38 | 1 | |
| 2 | | 18.24 | 2 | |
| 3 | | 20. 7 | 3 | |
| *e b e n w b w* | | 21.49 | *s e b e* | *s w b w* |
| 1 | | 23.29 | 1 | |

## Latitude 49 Degrees.

| North Decli-nation. | | Decli-nation. | South Decli-nation. | |
|---|---|---|---|---|
| ⊙riſe | ⊙ſet | D. M. | ⊙riſe | ⊙ſet |
| Eaſt | Weſt | 0. 0 | Eaſt | Weſt |
| 1 | | 1.51 | 1 | |
| 2 | | 3.42 | 2 | |
| 3 | | 5.31 | 3 | |
| *e by n w by n* | | 7.22 | *e by s* | *w by s* |
| 1 | | 9.10 | 1 | |
| 2 | | 10.59 | 2 | |
| 3 | | 12.46 | 3 | |
| *e n e w n w* | | 14.28 | *e s e* | *w s w* |
| 1 | | 16.17 | 1 | |
| 2 | | 18. 1 | 2 | |
| 3 | | 19.42 | 3 | |
| *n e b e n w b w* | | 21.22 | *s e b e* | *s w b w* |
| 1 | | 23. 1 | 1 | |

## Latitude 50 Degrees.

| | Weſt | 0. 0 | Eaſt | Weſt |
|---|---|---|---|---|
| 1 | | 1.48 | 1 | |
| 2 | | 3.37 | 2 | |
| 3 | | 5.25 | 3 | |
| *by n w by n* | | 7.12 | *e by s* | *w by s* |
| 1 | | 8.59 | 1 | |
| 2 | | 10.46 | 2 | |
| 3 | | 12.30 | 3 | |
| *e w n w* | | 14.14 | *e s e* | *w s w* |
| 1 | | 15.57 | 1 | |
| 2 | | 17.39 | 2 | |
| 3 | | 19.18 | 3 | |
| *e n w b w* | | 20.55 | *s e b e* | *s w b w* |
| 1 | | 22.21 | 1 | |

## Latitude 51 Degrees.

| Eaſt | Weſt | 0. 0 | Eaſt | Weſt |
|---|---|---|---|---|
| 1 | | 1.46 | 1 | |
| 2 | | 3.33 | 2 | |
| 3 | | 5.18 | 3 | |
| *e by n w by n* | | 7. 4 | *e by s* | *w by s* |
| 1 | | 8.48 | 1 | |
| 2 | | 10.32 | 2 | |
| 3 | | 12.14 | 3 | |
| *e n e w n w* | | 13.56 | *e s e* | *w s w* |
| 1 | | 15.36 | 1 | |
| 2 | | 17.16 | 2 | |
| 3 | | 18.52 | 3 | |
| *n e b e n w b w* | | 20.28 | *s e b e* | *s w b w* |
| 1 | | 22. 1 | 1 | |
| 2 | | 23.32 | 2 | |

| Latitude 52 Degrees. | | | | Latitude 53 Degrees. | | | |
|---|---|---|---|---|---|---|---|
| *North Decli.* | | *Decli.* | *South Decli.* | *North Decli.* | | *Decli.* | *South Decli.* |
| ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* ⊙*ſet* | ⊙*riſe* | ⊙*ſet* | D. M. | ⊙*riſe* ⊙*ſet* |
| East | Weſt | 0. 0 | East Weſt | East | Weſt | 0. 0 | East Weſt |
| 1 | | 1.44 | 1 | 1 | | 1.42 | 1 |
| 2 | | 3.28 | 2 | 2 | | 3.23 | 2 |
| 3 | | 5.11 | 3 | 3 | | 5. 4 | 3 |
| e *by* n w *by* n | | 6.54 | e *by* s w *by* s | e *by* n w *by* n | | 6.44 | e *by* s w *by* s |
| 1 | | 8.37 | 1 | 1 | | 8.25 | 1 |
| 2 | | 10.18 | 2 | 2 | | 10. 4 | 2 |
| 3 | | 11.58 | 3 | 3 | | 11.41 | 3 |
| e n e | w n w | 13.37 | e s e w s w | e n e | w n w | 13.19 | e s e w s w |
| 1 | | 15.16 | 1 | 1 | | 14.55 | 1 |
| 2 | | 16.52 | 2 | 2 | | 16.29 | 2 |
| 3 | | 18.27 | 3 | 3 | | 18. 1 | 3 |
| n e *b* e | n w *b* w | 20. 0 | s e *b* e s w *b* w | n e *b* e | n w *b* w | 19.32 | s e *b* e s w *b* w |
| 1 | | 21.31 | 1 | 1 | | 21. 1 | 1 |
| 2 | | 23. 0 | 2 | 2 | | 22.27 | 2 |

| Latitude 54 Degrees. | | | | Latitude 55 Degrees. | | | |
|---|---|---|---|---|---|---|---|
| East | Weſt | 0. 0 | East Weſt | East | Weſt | 0. 0 | East Weſt |
| 1 | | 1.39 | 1 | 1 | | 1.37 | 1 |
| 2 | | 3.18 | 2 | 2 | | 3.14 | 2 |
| 3 | | 4.57 | 3 | 3 | | 4.49 | 3 |
| e *by* n w *by* n | | 6.35 | e *by* s w *by* s | e *by* n w *by* n | | 6.25 | e *by* s w *by* s |
| 1 | | 8.13 | 1 | 1 | | 8. 1 | 1 |
| 2 | | 9.50 | 2 | 2 | | 9.35 | 2 |
| 3 | | 11.25 | 3 | 3 | | 11. 8 | 3 |
| e n e | w n w | 13. 0 | e s e w s w | e n e | w n w | 12.41 | e s e w s w |
| 1 | | 14.33 | 1 | 1 | | 14.12 | 1 |
| 2 | | 16. 5 | 2 | 2 | | 15.42 | 2 |
| 3 | | 17.35 | 3 | 3 | | 17. 9 | 3 |
| n e *b* e | n w *b* w | 19. 3 | s e *b* e s w *b* w | n e *b* e | n w *b* w | 18.35 | s e *b* e s w *b* w |
| 1 | | 20.30 | 1 | 1 | | 19.59 | 1 |
| 2 | | 21.54 | 2 | 2 | | 21.21 | 2 |
| 3 | | 23.15 | 3 | 3 | | 22.39 | 3 |

| Latitude 56 Degrees. | | | | Latitude 57 Degrees. | | | |
|---|---|---|---|---|---|---|---|
| North Decli. | | Decli. | South Decli. | North Decli. | | Decli. | South Decli. |
| ⊙rise | ⊙set | D. M. | ⊙rise ⊙set | ⊙rise | ⊙set | D. M. | ⊙rise ⊙set |
| East | West | 0. 0 | East West | East | West | 0. 0 | East West |
| 1 | | 1.34 | 1 | 1 | | 1.32 | 1 |
| 2 | | 3. 9 | 2 | 2 | | 3. 4 | 2 |
| 3 | | 4.42 | 3 | 3 | | 4.35 | 3 |
| e *by* n w *by* n | | 6.16 | e *by* s w *by* s | e *by* n w *by* n | | 6. 6 | e *by* s w *by* s |
| 1 | | 7.49 | 1 | 1 | | 7.36 | 1 |
| 2 | | 9.21 | 2 | 2 | | 9. 6 | 2 |
| 3 | | 10.51 | 3 | 3 | | 10.34 | 3 |
| ene wnw | | 12.22 | ese wsw | ene wnw | | 12. 1 | ese wsw |
| 1 | | 13.50 | 1 | 1 | | 13.28 | 1 |
| 2 | | 15.18 | 2 | 2 | | 14.53 | 2 |
| 3 | | 16.42 | 3 | 3 | | 16.16 | 3 |
| ne *by* nw *bw* | | 18. 6 | se *by* e sw *bw* | ne *by* nw *bw* | | 17.37 | se *by* e sw *bw* |
| 1 | | 19.28 | 1 | 1 | | 18.56 | 1 |
| 2 | | 20.47 | 2 | 2 | | 20.13 | 2 |
| 3 | | 22. 3 | 3 | 3 | | 21.27 | 3 |
| ne nw | | 23.18 | se sw | ne nw | | 22.39 | se sw |

| Latitude 58 Degrees. | | | | Latitude 59 Degrees. | | | |
|---|---|---|---|---|---|---|---|
| East | West | 0. 0 | East West | East | West | 0. 0 | East West |
| 1 | | 1.30 | 1 | 1 | | 1.27 | 1 |
| 2 | | 2.59 | 2 | 2 | | 2.54 | 2 |
| 3 | | 4.28 | 3 | 3 | | 4.20 | 3 |
| *by* n w *by* n | | 5.56 | e *by* s w *by* s | e *by* n w *by* n | | 5.46 | e *by* s w *by* s |
| 1 | | 7.24 | 1 | 1 | | 7.11 | 1 |
| 2 | | 8.51 | 2 | 2 | | 8.36 | 2 |
| 3 | | 10.17 | 3 | 3 | | 10. 0 | 3 |
| ne wnw | | 11.42 | ese wsw | ene wnw | | 11.22 | ese wsw |
| 1 | | 13. 6 | 1 | 1 | | 12.42 | 1 |
| 2 | | 14.28 | 2 | 2 | | 14. 3 | 2 |
| 3 | | 15.48 | 3 | 3 | | 15.21 | 3 |
| ne nw *bw* | | 17. 7 | se *by* e sw *bw* | ne *by* e nw *bw* | | 16.37 | se *by* e sw *bw* |
| 1 | | 18.24 | 1 | 1 | | 17.52 | 1 |
| 2 | | 19.38 | 2 | 2 | | 19. 4 | 2 |
| 3 | | 20.50 | 3 | 3 | | 20.14 | 3 |
| ne n w | | 22. 0 | se sw | ne nw | | 21.22 | se sw |
| 1 | | 23. 8 | 1 | 1 | | 22.26 | 1 |
| | | | | 2 | | 23.27 | 2 |

# Latitude 60 Degrees.

| *North Declination.* | | | *South Declination.* | | |
|---|---|---|---|---|---|
| ☉ *riſe.* | D. M. | ☉ *ſet.* | ☉ *riſe.* | D. M. | ☉ *ſet.* |
| Eaſt | 0. 0 | Weſt | Eaſt | 0. 0 | Weſt |
| 1 | 1. 25 | 1 | 1 | 1. 25 | 1 |
| 2 | 2. 49 | 2 | 2 | 2. 49 | 2 |
| 3 | 4. 12 | 3 | 3 | 4. 12 | 3 |
| e *by* n | 5. 36 | w *by* n | e *by* s | 5. 36 | w *by* s |
| 1 | 6. 59 | 1 | 1 | 6. 59 | 1 |
| 2 | 8. 21 | 2 | 2 | 8. 21 | 2 |
| 3 | 9. 42 | 3 | 3 | 9. 42 | 3 |
| ene | 11. 2 | wnw | ese | 11. 2 | wsw |
| 1 | 12. 21 | 1 | 1 | 12. 21 | 1 |
| 2 | 13. 38 | 2 | 2 | 13. 38 | 2 |
| 3 | 14. 53 | 3 | 3 | 14. 53 | 3 |
| ne *by* e | 16. 8 | nw *by* w | se *by* e | 16. 8 | sw *by* w |
| 1 | 17. 20 | 1 | 1 | 17. 20 | 1 |
| 2 | 18. 30 | 2 | 2 | 18. 30 | 2 |
| 3 | 19. 38 | 3 | 3 | 19. 38 | 3 |
| ne | 20. 42 | nw | s e | 20. 42 | s w |
| 1 | 21. 45 | 1 | 1 | 21. 45 | 1 |
| 2 | 22. 44 | 2 | 2 | 22. 44 | 2 |

# The *Deſcription* and *Uſe* OF THE Foregoing Tables.

1. THeſe Tables of Points of the Compaſs, at which the *Sun*, or any *Star* (whoſe Declination exceeds not 23 d. 30 m.) begin at Latitude 0 Degree) and proceeding orderly to 60 Degrees, (being ſome 4, ſome 2 Tables in one Page) are 61 in all.

2. In each Table are 5 Columns, the middlemoſt contains the Degrees of Declination, either North or South; thoſe 2 on the left hand of it, is *Sun-Riſing* and *Setting*, under North Declination; and on the right hand is the like, under South Declination.

3. The 1*ſt* and 2*d* Columns, (under *North Declination*) as alſo the 4*th* and 5*th* (under *South Declination*) contain the Points, and each quarter of a Point of the Compaſs, of both *Riſing* and *Setting*: Thus, *Eaſt*|*Weſt*, under which, is 1, 2, 3; that is, *Eaſt*, or *Weſt* 1 *quarter*, 2 *quarters*, 3 *quarters Northerly*, *Southerly*: then E *by* N, W *by* N, under which is 1, 2, 3; that is, *Eaſt and by North*, or *Weſt and by North*, 1 *quarter*, 2 *quarters Northerly*, &c.

These Tables are ready Helps to find the Variation of the Compaſs, with eaſe and ſufficient exactneſs; evidently made out in the following Uſes.

*To find the Point of the Compaſs that the Sun riſeth or ſets at, in any time of the Year.*

FIrſt ſeek the *Sun's Declination* in the Table of Declination for the Time propoſed; with which enter the foregoing Table, finding the *Latitude* in the head of the Table, and the *Declination* in the 3d Column; againſt which, on the left hand, if it be *North Declination*, but on the right hand, if it be *South Declination*, you will find the *Point of the Compaſs that the Sun riſeth or ſets at*, according to the Titles at the head of the Table.

*Note*; Theſe Tables ſhew the true Points of the Sun's Riſing or Setting: ſo that you may readily know at any time, ſeeing the Sun riſe or ſet, the Variation by an ordinary *Meridian Compaſs*.

There are ſome Compaſſes not touched ſo well as they ought to be: others, in time, the Virtue of the Stone wears off from the Needle.

Now by theſe foregoing Tables, you may very readily diſcover any of theſe Defects.

But it may be objected, that they cannot ſet the Sun by an ordinary *Meridian Compaſs*, ſo near as is required in ſuch a Caſe as this is.

To this I anſwer; It's as eaſy to ſet the Sun by the Compaſs, as ſteer a Ship by it: For expert Sea-men can ſet the Sun, or a *Head-land*, to near a quarter of a Point, by their Hand, (but with Sights, much nearer the Truth).

The Poſture to obſerve in ſuch a Caſe, I adviſe thus;

Set the Compaſs about two foot high; and directing your Hand towards the Sun, note what *Point*, *half Point* or *quarter Point*, the Sun riſeth or ſetteth on; then, in that Table belonging to your Latitude, ſee whether the Sun riſeth or ſets that Day upon the ſame Point, found by Obſervation: if they agree, there is no Variation; but if they do not agree, the Compaſs is not true, or there is Variation; and the Variation is ſo much as is the Difference between the Obſervation and the Table.

*Example* 1.

*Admit in Latitude* 30 *d. the Sun having* 9 *d.* 44 *m. North Declination; I obſerve the Sun that Day to riſe upon the E. N. E. Point of the Compaſs; I demand the Variation?*

In the head of the foregoing Tables, look for the *Latitude* 30 *Degrees*, and in the third Column for 9 d. 44 m. North Declination; againſt it (under Sun riſe) I find E. by N. which ſheweth that there is one Point Variation. For it appears by the Table, that the E. N. E. Point on the Compaſs, is the true E. by N. Point; and the E. by N. (as it is upon the Compaſs) is the true *Eaſt Point*; the *Eaſt Point* is the true E. by S; the S.E. is the S.E. by S; and the *South* is the S. by W; the *Weſt* is the W. by N; and the *North* is the N. by E.

This plainly appears by the *Rectifier*; if you bring the E. by N. on the inward Circle, to touch the E. N. E. on the outward Circle.

Now, ſuppoſe we were to obſerve the Sun at his ſetting, in the Latitude of 30 degrees, with Declination 9 deg. 44 min. North, as aboveſaid, we ſhould find

the Sun to ſet exactly at Weſt by the Compaſs, though by Obſervation in the Morning, we did ſ the Sun to riſe at E.N.E. I know this will be li leſs than a Contradiction to ſome: but if you c your Eye upon the *Rectifier*, you may ſee it is a c tain truth.

*Example* 2.

In Latitude 37 d. the Sun's Declination 8 d. 58 North, I obſerve the Sun to riſe upon the E. by Point of the Compaſs; I demand the Variation?

In the Table that belongs to 37 d. againſt 8 d. 58 North Declination, (and under Sun-riſe) I find by N; which ſheweth (ſeeing the Obſervation do agree with the Table) there is no Variation.

*Note*; If the Declination for the Day propo be not the ſame with the Declination in the Tab then have regard to the neareſt, allowing for Difference.

*Example* 3.

In Latitude 37 d. 0 m. ſuppoſe the Decli tion 10 d. 15 m. North; I demand the Point of Compaſs that the Sun ſhould riſe with?

In the Table the neareſt to 10 d. 15 m. is 11 12 m. againſt which the Sun riſeth E. by N. $\frac{1}{4}$ N. a ſets W. by N. $\frac{1}{4}$ N. but becauſe the Declination pr poſed, is near about the middle between 8 d. 48 and 11 d. 12 m. therefore the Sun riſeth E. by N. a quarter N. and ſetteth W. by N. half a quarter N.

Underſtand the like in any other caſe, let the D clination be what it will, in any other Latitude.

Exa

*Example* 4.

Admit in Latitude 38 d. 20 m. and Declination 50 m. South. I obſerve the Sun to riſe upon the S.E. Point of the Compaſs; I demand the Varia-

In the Table for Latitude 38 d. and againſt 19 d. m. (the neareſt to my Declination) I find E.S.E. quarter S; which ſheweth, that there is a quarter Point Variation: For the E.S.E. Point is E.S.E. S. and the North Point is N. ¼ E: For if you do ing E. S. E. ¼ S. on the inward Circle of the *Rectifier*, to touch E.S.E. on the outward Circle, then S.W. on your Compaſs, is S. S. W. ¼ W. and S. E. S.E. ¼ S. and Eaſt is Eaſt ¼ S: and ſo for any o- Point, half Point, or quarter Point; by caſting Eye upon the Inſtrument.

*Note*; That the Tables ſhew the true *Points of ri- and ſetting*, and the inward Circle on the *Recti-* doth the ſame: But the Compaſs, when it differ- from the Tables, ſheweth a falſe Point; and the ward Circle on the *Rectifier* doth the ſame.

*Example* 5.

Admit in Latitude 47 d. 24 m. the Declination d. 2 m. South, the Sun riſing upon the E. by S. int of the Compaſs; I demand the Variation?

By the Tables the Sun ſhould riſe E.S.E. therefore re is one Point Variation: for if you bring the E. E. on the inward Circle of the *Rectifier*, to touch E. by S. on the outward, then the N. by W. on Compaſs, is the true North Point; the N. W. is N. W. by N; and the S. by E. is the true South int.

By

By this time, I ſuppoſe my Reader able to di
ver, how much the *Variation* is, and how to re
it, without any *Geometrical Demonſtration*, or *A*
*metical Calculation*.

*Note*; If you have any odd minutes of Latit
go to that Table neareſt the Latitude you are in.

I come now to reſolve a Queſtion ſome are p
led with; and that is ſuch as this:

*Queſt.* If the Sun riſe at E. N. E. in any Lati
ſhould he not ſet the ſame Day at W. N. W. i
ſame Latitude?

*Anſw.* If there be no *Variation*, it will; but if t
be *Variation*, it will not be ſo: the Reaſon is ev
by the *Rectifier*.

By theſe Tables you may know the Point of
Compaſs, that any of the ſaid *fixed Stars* do ri
ſet with in any Latitude, (the Tables contain
ther North or South; if their Declination do
exceed the Sun's greateſt Declination.

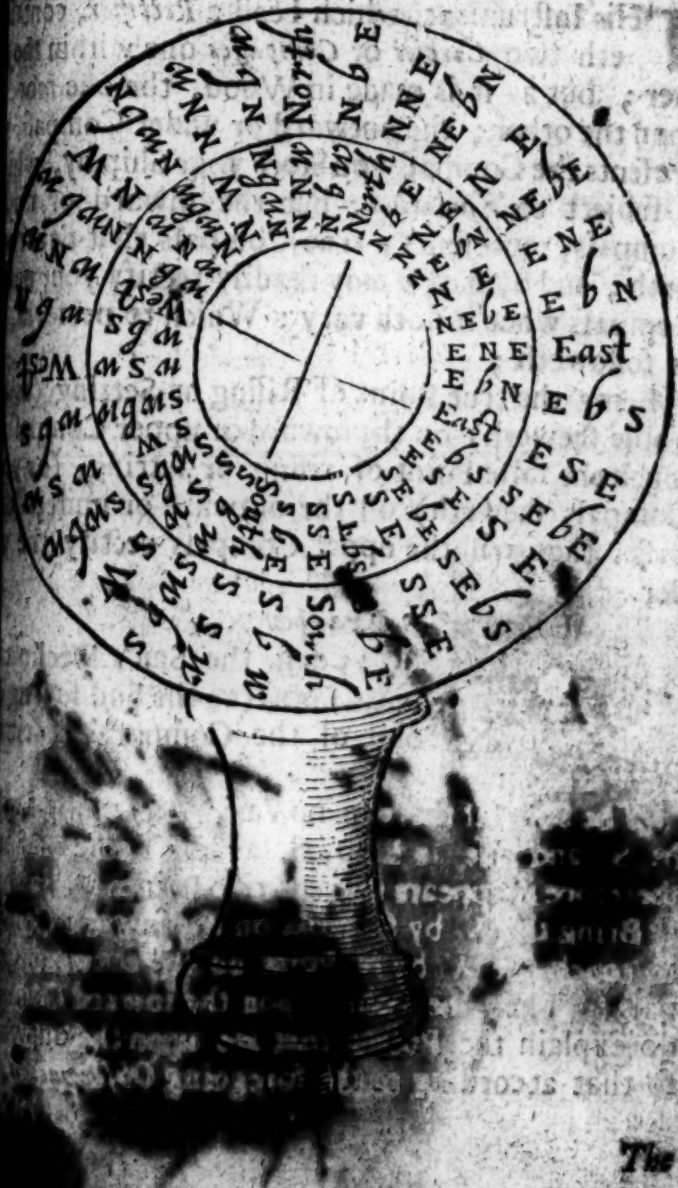
*Example* 6.

Let it be required to find the Point of the C
paſs the *Bull's Eye* riſeth and ſets with, in the L
tude of 50 Degrees?

The Declination of this Star is 15 d. 47 m. No
in the Table that belongs to 50 d. againſt 15 d. 4
North Declination, the Point of riſing is E. N
¼ N. and the Point of ſetting W. N. W. ¼ N.

Underſtand the like for any other Star, whoſe
clination exceeds not the Sun's greateſt Declin

## The Figure of a RECTIFIER.




The

## *The Description and Use of the* Rectifier.

THis Instrument, which I call a *Rectifier*, co[illegible] eth two *Circles* or *Compasses* one within [illegible] ther; but as it is made in Wood, the one m[illegible] upon the other; the outward or under Compa[illegible] presents the Compass you Steer your Ship by, [illegible] is subject to *Variation*: but the inward or [illegible] Compass, represents a true Compass that ne[illegible] rieth; and by it you may readily rectify your [illegible] Compass when it doth vary: Which to perfor[illegible] as followeth;

Bring the true Point of Rising or Setting ([illegible] Table sheweth) on the inward or upper Comp[illegible] touch the false Point of rising or setting, (a[illegible] Compass sheweth) on the outward or under C[illegible] pass; then will the upper Compass rectify th[illegible] der.

*Example* 7.

Ad[illegible] in Latitu[illegible] 45 deg. the Sun's Decli[illegible] being [illegible] 56 m[illegible] outh, I observe the Sun se[illegible] on th[illegible] by N. Point of the Compass; [illegible] the [illegible]ation.

[illegible] (i[illegible] there be no Variation) will [illegible] [illegible] by S. as the T[illegible] [illegible] there is two Poin[illegible] Va[illegible] [illegible] the inward [illegible] [illegible] The[illegible] [illegible] plain the [illegible] [illegible] accordi[illegible]

N. E. Point on your Compaſs, is the true North; North is the true N.N.W; the W. by N. is the W. by S; the S. E. by E. is the true E. by S; ſo for any other *Point of the Compaſs*, by only ſetting on the *Rectifier*.

And thus you may rectify the *Compaſs*, without knowing which way the *Variation* is, either *Eaſtward* or *Weſtward*; the *Rectifier* doth that for you plain, that you cannot be miſtaken.

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## ADVERTISEMENT.

THis *Rectifier* is made in Wood by *James Atkinſon* at the Cherry-Garden-ſtairs, on *Rotherhith-*

*A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.*

The Degrees of Latitude.

| Decli. Sun's | 1 D. | M. | 2 D. | M. | 3 D. | M. | 4 D. | M. | 5 D. | M. | 6 D. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 00 | | 00 | | 00 | | 00 | | 00 | | 00 |
| 1 | 01 | | 01 | | 01 | | 01 | | 01 | | 01 |
| 2 | 02 | | 02 | | 02 | | 02 | | 02 | | 02 |
| 3 | 03 | | 03 | | 03 | | 03 | | 03 | | 03 |
| 4 | 04 | | 04 | | 04 | | 04 | | 04 | 1 | 04 |
| 5 | 05 | | 05 | | 05 | | 05 | | 05 | 1 | 05 |
| 6 | 06 | | 06 | | 06 | | 06 | 1 | 06 | 1 | 06 |
| 7 | 07 | | 07 | | 07 | | 07 | 1 | 07 | 1 | 07 |
| 8 | 08 | | 08 | | 08 | 1 | 08 | 1 | 08 | 2 | 08 |
| 9 | 09 | | 09 | | 09 | 1 | 09 | 1 | 09 | 2 | 09 |
| 10 | 10 | | 10 | | 10 | 1 | 10 | 1 | 10 | 2 | 10 |
| 11 | 11 | | 11 | | 11 | 1 | 11 | 1 | 11 | 2 | 11 |
| 12 | 12 | | 12 | | 12 | 1 | 12 | 1 | 12 | 3 | 12 |
| 13 | 13 | | 13 | | 13 | 1 | 13 | 1 | 13 | 3 | 13 |
| 14 | 14 | | 14 | | 14 | 1 | 14 | 2 | 14 | 3 | 14 |
| 15 | 15 | | 15 | | 15 | 1 | 15 | 2 | 15 | 3 | 15 |
| 16 | 16 | | 16 | 1 | 16 | 1 | 16 | 2 | 16 | 4 | 16 |
| 17 | 17 | | 17 | 1 | 17 | 1 | 17 | 2 | 17 | 4 | 17 |
| 18 | 18 | | 18 | 1 | 18 | 1 | 18 | 2 | 18 | 4 | 18 |
| 19 | 19 | | 19 | 1 | 19 | 1 | 19 | 2 | 19 | 4 | 19 |
| 20 | 20 | | 20 | 1 | 20 | 2 | 20 | 3 | 20 | 5 | 20 |
| 21 | 21 | | 21 | 1 | 21 | 2 | 21 | 3 | 21 | 5 | 21 |
| 22 | 22 | | 22 | 1 | 22 | 2 | 22 | 3 | 22 | 5 | 22 |
| 23 | 23 | | 23 | 1 | 23 | 2 | 23 | 3 | 23 | 5 | 23 |
| 23,31 | 23 | 31 | 23 | 32 | 23 | 33 | 23 | 35 | 23 | 37 | 23 |

Degrees of Declination.

*A Table of Amplitudes, ſhewing all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.*

The Degrees of Latitude.

| Points | 7 | | 8 | | 9 | | 10 | | 11 | | 12 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 0 | 00 | | 00 | | 00 | | 00 | | 00 | | 00 | |
| 1 | 01 | | 01 | | 01 | | 01 | 1 | 01 | 1 | 01 | 1 |
| 2 | 02 | 1 | 02 | 1 | 02 | 1 | 02 | 2 | 02 | 2 | 02 | 3 |
| 3 | 03 | 1 | 03 | 1 | 03 | 1 | 03 | 3 | 03 | 3 | 03 | 4 |
| 4 | 04 | 2 | 04 | 2 | 04 | 2 | 04 | 4 | 04 | 4 | 04 | 5 |
| 5 | 05 | 2 | 05 | 2 | 05 | 3 | 05 | 5 | 05 | 5 | 05 | 7 |
| 6 | 06 | 2 | 06 | 3 | 06 | 4 | 06 | 6 | 06 | 6 | 06 | 8 |
| 7 | 07 | 3 | 07 | 4 | 07 | 5 | 07 | 7 | 07 | 8 | 07 | 9 |
| 8 | 08 | 3 | 08 | 4 | 08 | 6 | 08 | 8 | 08 | 9 | 08 | 11 |
| 9 | 09 | 4 | 09 | 5 | 09 | 6 | 09 | 9 | 09 | 10 | 09 | 12 |
| 10 | 10 | 4 | 10 | 6 | 10 | 7 | 10 | 10 | 10 | 11 | 10 | 13 |
| 11 | 11 | 5 | 11 | 6 | 11 | 8 | 11 | 11 | 11 | 13 | 11 | 15 |
| 12 | 12 | 5 | 12 | 7 | 12 | 9 | 12 | 12 | 12 | 14 | 12 | 16 |
| 13 | 13 | 6 | 13 | 8 | 13 | 9 | 13 | 13 | 13 | 15 | 13 | 17 |
| 14 | 14 | 6 | 14 | 8 | 14 | 10 | 14 | 14 | 14 | 16 | 14 | 19 |
| 15 | 15 | 7 | 15 | 9 | 15 | 11 | 15 | 15 | 15 | 17 | 15 | 20 |
| 16 | 16 | 7 | 16 | 10 | 16 | 12 | 16 | 16 | 16 | 19 | 16 | 22 |
| 17 | 17 | 8 | 17 | 10 | 17 | 13 | 17 | 17 | 17 | 20 | 17 | 23 |
| 18 | 18 | 8 | 18 | 11 | 18 | 14 | 18 | 18 | 18 | 21 | 18 | 25 |
| 19 | 19 | 9 | 19 | 12 | 19 | 15 | 19 | 19 | 19 | 22 | 19 | 26 |
| 20 | 20 | 9 | 20 | 12 | 20 | 16 | 20 | 20 | 20 | 24 | 20 | 28 |
| 21 | 21 | 10 | 21 | 13 | 21 | 17 | 21 | 21 | 21 | 25 | 21 | 29 |
| 22 | 22 | 10 | 22 | 13 | 22 | 18 | 22 | 22 | 22 | 27 | 22 | 31 |
| 23 | 23 | 11 | 23 | 14 | 23 | 19 | 23 | 23 | 23 | 28 | 23 | 33 |
| 31 | 23 | 42 | 23 | 46 | 23 | 50 | 23 | 54 | 23 | 59 | 24 | 65 |

*A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.*

The Degrees of Latitude.

| Sun's Decli. | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 |
| 1 | 01 | 2 | 01 | 2 | 01 | 2 | 01 | 2 | 01 | 2 | 01 | 3 |
| 2 | 02 | 3 | 02 | 4 | 02 | 4 | 02 | 5 | 02 | 5 | 02 | 6 |
| 3 | 03 | 5 | 03 | 5 | 03 | 6 | 03 | 7 | 03 | 8 | 03 | 9 |
| 4 | 04 | 6 | 04 | 7 | 04 | 8 | 04 | 10 | 04 | 11 | 04 | 12 |
| 5 | 05 | 8 | 05 | 9 | 05 | 10 | 05 | 12 | 05 | 13 | 05 | 15 |
| 6 | 06 | 10 | 06 | 11 | 06 | 13 | 06 | 15 | 06 | 17 | 06 | 19 |
| 7 | 07 | 11 | 07 | 13 | 07 | 15 | 07 | 17 | 07 | 19 | 07 | 22 |
| 8 | 08 | 13 | 08 | 15 | 08 | 17 | 08 | 19 | 08 | 22 | 08 | 25 |
| 9 | 09 | 14 | 09 | 17 | 09 | 19 | 09 | 22 | 09 | 25 | 09 | 28 |
| 10 | 10 | 16 | 10 | 19 | 10 | 21 | 10 | 24 | 10 | 28 | 10 | 32 |
| 11 | 11 | 17 | 11 | 20 | 11 | 23 | 11 | 27 | 11 | 30 | 11 | 34 |
| 12 | 12 | 19 | 12 | 22 | 12 | 25 | 12 | 29 | 12 | 33 | 12 | 38 |
| 13 | 13 | 20 | 13 | 24 | 13 | 27 | 13 | 32 | 13 | 36 | 13 | 41 |
| 14 | 14 | 22 | 14 | 26 | 14 | 30 | 14 | 34 | 14 | 39 | 14 | 45 |
| 15 | 15 | 24 | 15 | 28 | 15 | 32 | 15 | 37 | 15 | 42 | 15 | 47 |
| 16 | 16 | 26 | 16 | 30 | 16 | 35 | 16 | 40 | 16 | 45 | 16 | 51 |
| 17 | 17 | 28 | 17 | 32 | 17 | 37 | 17 | 42 | 17 | 48 | 17 | 54 |
| 18 | 18 | 30 | 18 | 34 | 18 | 39 | 18 | 45 | 18 | 51 | 18 | 58 |
| 19 | 19 | 31 | 19 | 36 | 19 | 42 | 19 | 48 | 19 | 54 | 20 | 01 |
| 20 | 20 | 33 | 20 | 38 | 20 | 44 | 20 | 51 | 21 | 57 | 21 | 04 |
| 21 | 21 | 35 | 21 | 40 | 21 | 46 | 21 | 53 | 22 | 00 | 22 | 08 |
| 22 | 22 | 37 | 22 | 43 | 22 | 49 | 22 | 56 | 23 | 04 | 23 | 11 |
| 23 | 23 | 39 | 23 | 45 | 23 | 51 | 23 | 58 | 24 | 06 | 24 | 15 |
| 23,31 | 24 | 11 | 24 | 17 | 24 | 24 | 24 | 32 | 25 | 40 | 24 | 49 |

Degrees of Declination.

A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.

The Degrees of Latitude.

| Sun's Decl. | 19 | | 20 | | 21 | | 22 | | 23 | | 24 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 1 | 01 | 03 | 01 | 04 | 01 | 04 | 01 | 05 | 01 | 05 | 01 | 06 |
| 2 | 02 | 07 | 02 | 08 | 02 | 08 | 02 | 09 | 02 | 10 | 02 | 12 |
| 3 | 03 | 10 | 03 | 12 | 03 | 13 | 03 | 14 | 03 | 15 | 03 | 17 |
| 4 | 04 | 14 | 04 | 16 | 04 | 17 | 04 | 19 | 04 | 21 | 04 | 23 |
| 5 | 05 | 17 | 05 | 19 | 05 | 21 | 05 | 23 | 05 | 26 | 05 | 28 |
| 6 | 06 | 21 | 06 | 23 | 06 | 26 | 06 | 28 | 06 | 31 | 06 | 34 |
| 7 | 07 | 24 | 07 | 27 | 07 | 30 | 07 | 33 | 07 | 37 | 07 | 40 |
| 8 | 08 | 28 | 08 | 31 | 08 | 34 | 08 | 38 | 08 | 42 | 08 | 46 |
| 9 | 09 | 31 | 09 | 35 | 09 | 39 | 09 | 43 | 09 | 47 | 09 | 51 |
| 10 | 10 | 35 | 10 | 39 | 10 | 43 | 10 | 48 | 10 | 52 | 10 | 57 |
| 11 | 11 | 38 | 11 | 43 | 11 | 48 | 11 | 53 | 11 | 58 | 12 | 03 |
| 12 | 12 | 42 | 12 | 47 | 12 | 52 | 12 | 58 | 13 | 03 | 13 | 09 |
| 13 | 13 | 46 | 13 | 51 | 13 | 57 | 14 | 03 | 14 | 09 | 14 | 15 |
| 14 | 14 | 50 | 14 | 55 | 15 | 01 | 15 | 08 | 15 | 14 | 15 | 21 |
| 15 | 15 | 53 | 16 | 00 | 16 | 06 | 16 | 13 | 16 | 20 | 16 | 27 |
| 16 | 16 | 57 | 17 | 04 | 17 | 11 | 17 | 18 | 17 | 26 | 17 | 34 |
| 17 | 18 | 01 | 18 | 08 | 18 | 15 | 18 | 23 | 18 | 31 | 18 | 40 |
| 18 | 19 | 05 | 19 | 12 | 19 | 20 | 19 | 28 | 19 | 37 | 19 | 46 |
| 19 | 20 | 08 | 20 | 16 | 20 | 24 | 20 | 33 | 20 | 42 | 20 | 52 |
| 20 | 21 | 12 | 21 | 20 | 21 | 29 | 21 | 39 | 21 | 49 | 21 | 59 |
| 21 | 22 | 16 | 22 | 25 | 22 | 34 | 22 | 44 | 22 | 55 | 23 | 07 |
| 22 | 23 | 20 | 23 | 29 | 23 | 39 | 23 | 50 | 24 | 01 | 24 | 12 |
| 23 | 24 | 24 | 24 | 34 | 24 | 44 | 24 | 55 | 25 | 07 | 25 | 19 |
| 24 | 24 | 58 | 25 | 08 | 25 | 18 | 25 | 29 | 25 | 41 | 25 | 54 |

*A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.*

The Degrees of Latitude.

| Decli. Sun's | 25 D. | 25 M. | 26 D. | 26 M. | 27 D. | 27 M. | 28 D. | 28 M. | 29 D. | 29 M. | 30 D. | 30 M. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 |
| 1 | 01 | 6 | 01 | 7 | 01 | 8 | 01 | 8 | 01 | 9 | 01 | 9 |
| 2 | 02 | 12 | 02 | 13 | 02 | 15 | 02 | 16 | 02 | 17 | 02 | 18 |
| 3 | 03 | 18 | 03 | 20 | 03 | 22 | 03 | 24 | 03 | 26 | 03 | 28 |
| 4 | 04 | 25 | 04 | 27 | 04 | 29 | 04 | 32 | 04 | 34 | 04 | 37 |
| 5 | 05 | 31 | 05 | 34 | 05 | 37 | 05 | 40 | 05 | 43 | 05 | 46 |
| 6 | 06 | 37 | 06 | 41 | 06 | 44 | 06 | 48 | 06 | 52 | 06 | 56 |
| 7 | 07 | 43 | 07 | 47 | 07 | 51 | 07 | 56 | 08 | 1 | 08 | 6 |
| 8 | 08 | 50 | 08 | 54 | 08 | 59 | 09 | 4 | 09 | 9 | 09 | 15 |
| 9 | 09 | 56 | 10 | 1 | 10 | 6 | 10 | 12 | 10 | 18 | 10 | 25 |
| 10 | 11 | 3 | 11 | 8 | 11 | 14 | 11 | 21 | 11 | 27 | 11 | 35 |
| 11 | 12 | 9 | 12 | 15 | 12 | 21 | 12 | 28 | 12 | 36 | 12 | 45 |
| 12 | 13 | 16 | 13 | 28 | 13 | 30 | 13 | 37 | 13 | 45 | 13 | 55 |
| 13 | 14 | 22 | 14 | 30 | 14 | 37 | 14 | 45 | 14 | 54 | 15 | 5 |
| 14 | 15 | 29 | 15 | 37 | 15 | 45 | 15 | 54 | 16 | 3 | 16 | 15 |
| 15 | 16 | 35 | 16 | 44 | 16 | 53 | 17 | 3 | 17 | 12 | 17 | 25 |
| 16 | 17 | 42 | 17 | 51 | 18 | 1 | 18 | 11 | 18 | 21 | 18 | 35 |
| 17 | 18 | 49 | 18 | 59 | 19 | 9 | 19 | 20 | 19 | 31 | 19 | 46 |
| 18 | 19 | 56 | 20 | 6 | 20 | 17 | 20 | 29 | 20 | 41 | 20 | 56 |
| 19 | 21 | 2 | 21 | 13 | 21 | 25 | 21 | 38 | 21 | 51 | 22 | 7 |
| 20 | 22 | 10 | 22 | 22 | 22 | 34 | 22 | 48 | 23 | 2 | 23 | 18 |
| 21 | 23 | 18 | 23 | 30 | 23 | 43 | 23 | 57 | 24 | 12 | 24 | 30 |
| 22 | 24 | 24 | 24 | 37 | 24 | 51 | 25 | 6 | 25 | 22 | 25 | 42 |
| 23 | 25 | 32 | 25 | 46 | 26 | 1 | 26 | 16 | 26 | 32 | 26 | 54 |
| 23,31 | 26 | 8 | 26 | 23 | 26 | 29 | 26 | 46 | 27 | 3 | 27 | 27 |

Degrees of Declination.

*A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.*

The Degrees of Latitude.

| Degrees. | 31 | | 32 | | 33 | | 34 | | 35 | | 36 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 00 | 00 | 0 | 00 | 0 |
| 1 | 01 | 10 | 01 | 10 | 01 | 11 | 01 | 12 | 01 | 13 | 01 | 14 |
| 2 | 02 | 19 | 02 | 21 | 02 | 23 | 02 | 25 | 02 | 27 | 02 | 29 |
| 3 | 03 | 30 | 03 | 33 | 03 | 35 | 03 | 38 | 03 | 40 | 03 | 43 |
| 4 | 04 | 40 | 04 | 43 | 04 | 46 | 04 | 50 | 04 | 57 | 04 | 57 |
| 5 | 05 | 50 | 05 | 54 | 05 | 58 | 06 | 2 | 06 | 6 | 06 | 11 |
| 6 | 07 | 0 | 07 | 5 | 07 | 10 | 07 | 15 | 07 | 20 | 07 | 25 |
| 7 | 08 | 11 | 08 | 16 | 08 | 21 | 08 | 27 | 08 | 33 | 08 | 40 |
| 8 | 09 | 21 | 09 | 27 | 09 | 33 | 09 | 39 | 09 | 46 | 09 | 54 |
| 9 | 10 | 31 | 10 | 38 | 10 | 45 | 10 | 52 | 11 | 0 | 11 | 08 |
| 10 | 11 | 41 | 11 | 48 | 11 | 55 | 12 | 3 | 12 | 12 | 12 | 21 |
| 11 | 12 | 52 | 13 | 0 | 13 | 9 | 13 | 18 | 13 | 28 | 13 | 39 |
| 12 | 14 | 2 | 14 | 11 | 14 | 21 | 14 | 32 | 14 | 43 | 14 | 54 |
| 13 | 15 | 13 | 15 | 23 | 15 | 33 | 15 | 44 | 15 | 56 | 16 | 9 |
| 14 | 16 | 22 | 16 | 33 | 16 | 45 | 16 | 57 | 17 | 10 | 17 | 24 |
| 15 | 17 | 34 | 17 | 46 | 17 | 58 | 18 | 11 | 18 | 25 | 18 | 40 |
| 16 | 18 | 44 | 18 | 57 | 19 | 11 | 19 | 25 | 19 | 40 | 19 | 55 |
| 17 | 19 | 56 | 20 | 10 | 20 | 24 | 20 | 39 | 20 | 55 | 21 | 11 |
| 18 | 21 | 7 | 21 | 21 | 21 | 36 | 21 | 53 | 22 | 10 | 22 | 27 |
| 19 | 22 | 19 | 22 | 34 | 22 | 50 | 23 | 7 | 23 | 25 | 23 | 44 |
| 20 | 23 | 31 | 23 | 47 | 24 | 4 | 24 | 22 | 24 | 41 | 25 | 0 |
| 21 | 24 | 43 | 25 | 0 | 25 | 18 | 25 | 37 | 25 | 56 | 26 | 17 |
| 22 | 25 | 55 | 26 | 13 | 26 | 32 | 26 | 52 | 27 | 13 | 27 | 35 |
| 23 | 27 | 7 | 27 | 26 | 27 | 46 | 28 | 7 | 28 | 29 | 28 | 52 |
| 31 | 27 | 40 | 28 | 0 | 28 | 21 | 28 | 43 | 29 | 7 | 29 | 31 |

*A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.*

The Degrees of Latitude.

| Sun's Decli. | 37 | | 38 | | 39 | | 40 | | 41 | | 42 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 1 | 01 | 15 | 01 | 16 | 01 | 17 | 01 | 18 | 01 | 20 | 01 | 21 |
| 2 | 02 | 30 | 02 | 32 | 02 | 34 | 02 | 36 | 02 | 39 | 02 | 41 |
| 3 | 03 | 45 | 03 | 48 | 03 | 51 | 03 | 54 | 03 | 58 | 04 | 02 |
| 4 | 05 | 00 | 05 | 04 | 05 | 08 | 05 | 13 | 05 | 18 | 05 | 23 |
| 5 | 06 | 16 | 06 | 21 | 06 | 26 | 06 | 32 | 06 | 38 | 06 | 44 |
| 6 | 07 | 31 | 07 | 37 | 07 | 43 | 07 | 50 | 07 | 57 | 08 | 05 |
| 7 | 08 | 47 | 08 | 54 | 09 | 01 | 09 | 09 | 09 | 17 | 09 | 26 |
| 8 | 10 | 02 | 10 | 10 | 10 | 19 | 10 | 28 | 10 | 37 | 10 | 47 |
| 9 | 11 | 17 | 11 | 27 | 11 | 37 | 11 | 47 | 11 | 58 | 12 | 09 |
| 10 | 12 | 32 | 12 | 43 | 12 | 54 | 13 | 06 | 13 | 18 | 13 | 31 |
| 11 | 13 | 50 | 14 | 01 | 14 | 13 | 14 | 26 | 14 | 39 | 14 | 53 |
| 12 | 15 | 06 | 15 | 18 | 15 | 31 | 15 | 45 | 16 | 00 | 16 | 14 |
| 13 | 16 | 22 | 16 | 35 | 16 | 49 | 17 | 04 | 17 | 20 | 17 | 37 |
| 14 | 17 | 38 | 17 | 52 | 18 | 08 | 18 | 24 | 18 | 42 | 19 | 00 |
| 15 | 18 | 55 | 19 | 11 | 19 | 28 | 19 | 45 | 20 | 04 | 20 | 23 |
| 16 | 20 | 11 | 20 | 28 | 20 | 46 | 21 | 05 | 21 | 25 | 21 | 44 |
| 17 | 21 | 28 | 21 | 46 | 22 | 06 | 22 | 26 | 22 | 48 | 23 | 10 |
| 18 | 22 | 46 | 23 | 05 | 23 | 25 | 23 | 47 | 24 | 10 | 24 | 34 |
| 19 | 24 | 04 | 24 | 24 | 24 | 46 | 25 | 09 | 25 | 33 | 25 | 58 |
| 20 | 25 | 21 | 25 | 43 | 26 | 06 | 26 | 30 | 26 | 56 | 27 | 24 |
| 21 | 26 | 39 | 27 | 02 | 27 | 27 | 27 | 53 | 28 | 21 | 28 | 50 |
| 22 | 27 | 58 | 28 | 23 | 28 | 49 | 29 | 16 | 29 | 45 | 30 | 16 |
| 23 | 29 | 17 | 29 | 43 | 30 | 11 | 30 | 40 | 31 | 11 | 31 | 43 |
| 23,31 | 29 | 57 | 30 | 24 | 30 | 52 | 31 | 22 | 31 | 54 | 32 | 28 |

Degrees of Declination.

A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.

The Degrees of Latitude.

| Sun's Declin. | 43 | | 44 | | 45 | | 46 | | 47 | | 48 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 0 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| 1 | 01 | 22 | 01 | 23 | 01 | 25 | 01 | 26 | 01 | 28 | 01 | 29 |
| 2 | 03 | 44 | 02 | 47 | 02 | 50 | 02 | 53 | 02 | 56 | 02 | 59 |
| 3 | 04 | 06 | 04 | 10 | 04 | 15 | 04 | 19 | 04 | 24 | 04 | 29 |
| 4 | 05 | 28 | 05 | 34 | 05 | 40 | 05 | 46 | 05 | 52 | 05 | 59 |
| 5 | 06 | 51 | 06 | 58 | 07 | 05 | 07 | 12 | 07 | 20 | 07 | 29 |
| 6 | 08 | 13 | 08 | 21 | 08 | 30 | 08 | 39 | 08 | 49 | 08 | 59 |
| 7 | 09 | 35 | 09 | 45 | 09 | 56 | 10 | 06 | 10 | 18 | 10 | 30 |
| 8 | 10 | 58 | 11 | 09 | 11 | 21 | 11 | 34 | 11 | 47 | 12 | 00 |
| 9 | 12 | 21 | 12 | 34 | 12 | 47 | 13 | 01 | 13 | 16 | 13 | 31 |
| 10 | 13 | 44 | 13 | 58 | 14 | 13 | 14 | 28 | 14 | 44 | 15 | 02 |
| 11 | 15 | 07 | 15 | 22 | 15 | 38 | 15 | 55 | 16 | 15 | 16 | 34 |
| 12 | 16 | 31 | 16 | 48 | 17 | 06 | 17 | 25 | 17 | 45 | 18 | 06 |
| 13 | 17 | 55 | 18 | 13 | 18 | 33 | 18 | 54 | 19 | 16 | 19 | 39 |
| 14 | 19 | 18 | 19 | 39 | 20 | 00 | 20 | 23 | 20 | 47 | 21 | 12 |
| 15 | 20 | 43 | 21 | 05 | 21 | 28 | 21 | 52 | 22 | 18 | 22 | 45 |
| 16 | 22 | 08 | 22 | 32 | 22 | 56 | 23 | 23 | 23 | 50 | 24 | 20 |
| 17 | 23 | 34 | 23 | 59 | 24 | 25 | 24 | 53 | 25 | 23 | 25 | 55 |
| 18 | 24 | 59 | 25 | 26 | 25 | 54 | 26 | 25 | 26 | 57 | 27 | 31 |
| 19 | 26 | 25 | 26 | 54 | 27 | 25 | 27 | 58 | 28 | 32 | 29 | 07 |
| 20 | 27 | 53 | 28 | 23 | 28 | 56 | 29 | 31 | 30 | 07 | 30 | 45 |
| 21 | 29 | 20 | 29 | 53 | 30 | 27 | 31 | 03 | 31 | 42 | 32 | 23 |
| 22 | 30 | 48 | 31 | 22 | 31 | 58 | 32 | 37 | 33 | 18 | 34 | 03 |
| 23 | 32 | 16 | 32 | 51 | 33 | 30 | 34 | 12 | 34 | 56 | 35 | 43 |
| 23½ | 33 | 03 | 33 | 40 | 34 | 20 | 35 | 03 | 35 | 48 | 36 | 35 |

Degrees of Declination.

*A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.*

The Degrees of Latitude.

| Sun's Declin. | 49 | | 50 | | 51 | | 52 | | 53 | | 54 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 0 | 00 | 000 | 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 |
| 1 | 01 | 31 | 01 | 33 | 01 | 35 | 01 | 37 | 01 | 39 | 01 | 41 |
| 2 | 03 | 03 | 03 | 06 | 03 | 10 | 03 | 15 | 03 | 20 | 03 | 25 |
| 3 | 05 | 34 | 04 | 40 | 04 | 46 | 04 | 52 | 04 | 59 | 05 | 06 |
| 4 | 06 | 06 | 06 | 14 | 06 | 22 | 06 | 30 | 06 | 39 | 06 | 48 |
| 5 | 07 | 38 | 07 | 48 | 07 | 58 | 08 | 08 | 08 | 19 | 08 | 31 |
| 6 | 09 | 10 | 09 | 21 | 09 | 33 | 09 | 46 | 10 | 00 | 10 | 15 |
| 7 | 10 | 42 | 10 | 55 | 11 | 09 | 11 | 24 | 11 | 40 | 11 | 57 |
| 8 | 12 | 14 | 12 | 29 | 12 | 45 | 13 | 02 | 13 | 21 | 13 | 41 |
| 9 | 13 | 47 | 14 | 05 | 14 | 24 | 14 | 43 | 15 | 04 | 15 | 26 |
| 10 | 15 | 21 | 15 | 40 | 16 | 01 | 16 | 23 | 16 | 46 | 17 | 11 |
| 11 | 16 | 54 | 17 | 16 | 17 | 39 | 18 | 03 | 18 | 29 | 18 | 57 |
| 12 | 18 | 28 | 18 | 52 | 19 | 18 | 19 | 44 | 20 | 12 | 20 | 43 |
| 13 | 20 | 03 | 20 | 29 | 20 | 57 | 21 | 26 | 21 | 57 | 22 | 30 |
| 14 | 21 | 38 | 22 | 06 | 22 | 37 | 23 | 08 | 23 | 42 | 24 | 18 |
| 15 | 23 | 14 | 23 | 45 | 24 | 18 | 24 | 52 | 25 | 28 | 26 | 07 |
| 16 | 24 | 51 | 25 | 24 | 25 | 59 | 26 | 36 | 27 | 16 | 27 | 57 |
| 17 | 26 | 28 | 27 | 03 | 27 | 41 | 28 | 21 | 29 | 04 | 29 | 51 |
| 18 | 28 | 06 | 28 | 43 | 29 | 24 | 30 | 07 | 30 | 53 | 31 | 46 |
| 19 | 29 | 45 | 30 | 25 | 31 | 08 | 31 | 55 | 32 | 45 | 33 | 43 |
| 20 | 31 | 25 | 32 | 08 | 32 | 54 | 33 | 46 | 34 | 39 | 35 | 41 |
| 21 | 33 | 06 | 33 | 52 | 34 | 41 | 35 | 34 | 36 | 31 | 37 | 39 |
| 22 | 34 | 48 | 35 | 37 | 36 | 30 | 37 | 27 | 38 | 29 | 39 | 38 |
| 23 | 36 | 33 | 37 | 26 | 38 | 23 | 39 | 24 | 40 | 29 | 41 | 40 |
| 23 31 | 37 | 26 | 38 | 20 | 39 | 19 | 40 | 23 | 41 | 32 | 42 | 46 |

Degrees of Declination.

*A Table of Amplitudes, fitting all Places from the Equinoctial to 60 Degrees of Latitude, either North or South.*

The Degrees of Latitude.

| Degrees of Declination. Sun's | 55 | | 56 | | 57 | | 58 | | 59 | | 60 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. | D. | M. |
| 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 | 00 | 0 |
| 1 | 01 | 45 | 01 | 47 | 01 | 50 | 01 | 53 | 01 | 56 | 02 | 00 |
| 2 | 03 | 29 | 03 | 34 | 03 | 40 | 03 | 46 | 03 | 53 | 04 | 00 |
| 3 | 05 | 14 | 05 | 22 | 05 | 31 | 05 | 40 | 05 | 50 | 06 | 00 |
| 4 | 06 | 59 | 07 | 10 | 07 | 22 | 07 | 34 | 07 | 47 | 08 | 01 |
| 5 | 08 | 44 | 08 | 57 | 09 | 11 | 09 | 26 | 09 | 43 | 10 | 02 |
| 6 | 10 | 30 | 10 | 47 | 11 | 04 | 11 | 22 | 11 | 42 | 12 | 04 |
| 7 | 12 | 15 | 12 | 35 | 12 | 56 | 13 | 18 | 13 | 41 | 14 | 06 |
| 8 | 14 | 02 | 14 | 24 | 14 | 48 | 15 | 14 | 15 | 41 | 16 | 10 |
| 9 | 15 | 49 | 16 | 14 | 16 | 41 | 17 | 10 | 17 | 41 | 18 | 14 |
| 10 | 17 | 37 | 18 | 05 | 18 | 35 | 19 | 07 | 19 | 41 | 20 | 18 |
| 11 | 19 | 26 | 19 | 56 | 20 | 29 | 21 | 04 | 21 | 43 | 22 | 26 |
| 12 | 21 | 15 | 21 | 49 | 22 | 25 | 23 | 04 | 23 | 47 | 24 | 34 |
| 13 | 23 | 05 | 23 | 43 | 24 | 23 | 25 | 07 | 25 | 54 | 26 | 45 |
| 14 | 24 | 56 | 25 | 37 | 26 | 21 | 27 | 09 | 28 | 01 | 28 | 56 |
| 15 | 26 | 49 | 27 | 34 | 28 | 22 | 29 | 14 | 30 | 10 | 31 | 10 |
| 16 | 28 | 43 | 29 | 32 | 30 | 24 | 31 | 21 | 32 | 22 | 33 | 27 |
| 17 | 30 | 39 | 31 | 31 | 32 | 27 | 33 | 28 | 34 | 32 | 35 | 47 |
| 18 | 32 | 35 | 33 | 33 | 34 | 34 | 35 | 40 | 36 | 52 | 38 | 10 |
| 19 | 34 | 35 | 35 | 36 | 36 | 43 | 37 | 54 | 39 | 13 | 40 | 37 |
| 20 | 36 | 36 | 37 | 42 | 38 | 53 | 40 | 12 | 41 | 37 | 43 | 10 |
| 21 | 38 | 39 | 39 | 51 | 41 | 09 | 42 | 34 | 44 | 05 | 45 | 47 |
| 22 | 40 | 47 | 42 | 04 | 43 | 27 | 44 | 59 | 46 | 40 | 48 | 32 |
| 23 | 42 | 56 | 44 | 19 | 45 | 50 | 47 | 30 | 49 | 21 | 51 | 24 |
| 23,31 | 44 | 06 | 45 | 32 | 47 | 05 | 48 | 49 | 50 | 44 | 52 | 53 |

## *The Use of this Table of* Amplitudes.

THe *Amplitude* is the Distance of Rising or Setting of the Sun or Stars from the East or West Points upon the Horizon.

And note; The Sun or Star having North Declination, they rise to the Northward of the East, and set to the Northward of the West: But if their Declination be South, they rise to the Southward of the East, and set to the Southward of the West: And by these Tables, is thus found:

Look the Latitude in the head of the Table, and Declination in the first Column on the left hand, and in the common Angle of meeting is the Amplitude desired.

*Example* 1.

In the Latitude of 30 d. the Sun's Declination being 7 d. 0 m. North; I demand the Amplitude?

*Answ.* The Amplitude is 8 d. 6 m. for under Latitude 30 d. and against Declination 7 d. you will find 8 d. 6 m. which is the Amplitude from the East Northward, at Sun rising; or from the West Northward, at Sun setting. But if the Declination had been 7 d. 0 m. South, in Latitude 30 d. as aforesaid, then the Amplitude would have been 8 d. 6 m. from the East Southward at Sun rising, and 8 d. 6 m. from the West Southward at Sun setting. For if the Declination be North, the true Amplitude will always be

the Northwards of the East or West: But if South, to the Southwards.

If you have any odd Minutes of Declination, you must take the proportionable part.

*Example* 2.

In the Latitude of 42 d. 30 m. the Sun's Declination being 12 d. 15 m. I demand the Amplitude?

*Answ.* The Amplitude is 16 d. 43 m. found as follows;

According to the former Directions for the Latit. of 42 d. and Declin. { 12 / 13 } d. the Amplitude is { 16 d. 16 m. / 17 d. 38 m. }

Subtract, and their Difference is —— 1 d. 22 m.

Then say; As 1 d. or 60 m. is to 1 d. 22 m. or 82 m. so is 15 m. to 20 m. found as here under:

60 m. —— 82 m. —— 15 m.

15

410

82

6(0)123(0(20 m. proportional Part

0 30 Remainder.

Lat. 42 d. & Declin. 16 d. the Amplit. is 16 d. 16 m.

To it add proportional Part above —— 0 d. 20 m.

The true Amplit. for Declin. 12 d. 15 m. to be 16 d. 36 m.

Again,

Again, for Lat. 43 d. and Dec. $\left\{\begin{matrix}12\\13\end{matrix}\right\}$ d. Amp. is $\left\{\begin{matrix}\\\end{matrix}\right.$

Subtracted, makes Difference to be ——

Then say; As 60 m. is to 1 d. 24 m. or 84 m.
So is 15 m. to 21 m. found as here under:
If 60 m. —— 84 m. ——

15

420
84

6(0)126(0(22 m. proportional

06

00 Remainder.

Lat. 43 d. and Declin. 12 d. Amplitude is 16 d.
To it add proportional Part above —— 0 d.
Gives for Declin. 12 d. 15 m. the Amplit. 16 d.

Now because the given Latitude 42 d. 30 m. is the middle, between 42 d. and 43 m. therefore Medium of the Amplitudes before found, is Amplitude required, and is thus;

Lat. $\left\{\begin{matrix}42\\43\end{matrix}\right\}$ d. Decl. 12 d. 15 m. the Ampl. is $\left\{\begin{matrix}16\text{ d.}\\16\text{ d.}\end{matrix}\right.$

Added together, is —— 33
The $\frac{1}{2}$ is the Amplitude required —— 16

Thus may the Amplitude be found for any odd ...tes of Latitude, or Declination; tho the Ta... is calculated for whole Degrees only.

By this Table the Variation of the Compaſs is moſt ...ily found: for by the Azimuth Compaſs find the ...n or Stars Magnetical Amplitude, at their Riſing ... Setting; and the true Amplitude (according to ... Latitude of the Place, and their Declination) by ...is Table the Difference of theſe Amplitudes (when ...th are North, or both South) but their Sum (if ...e North, the other South) is the Variation.

But by the *Rectifier* it's moſt eaſily done thus;

Bring the Magnetical Amplitude (on the upper ...ompaſs) right againſt the true (on the lower); then ...th the North Point in the upper ſtand againſt the ...ariation in the lower; and the upper Compaſs is ...xplained in all its parts by the lower.

*Example 1.*

Suppoſe the Magnetical Amplitude at Riſing ...ound by the Azimuth Compaſs) be Eaſt Southerly ...5 d. 30 m. and the true Amplitude (according to ... Latitude of the Place, and Declination of the ...bject obſerved) be Eaſt Southerly 26 d. 45 m. I ...emand the Variation of the Compaſs?

*By the* Rectifier.

Bring 15 d. 30 m. Eaſt Southerly on the upper ...mpaſs, againſt 26 d. 45 m. Eaſt Southerly on the ...wer; then doth the North Point, on the firſt ſtand right

right againſt 11 d. 15 m. North Eaſterly, on the l
ter; ſo that the Compaſs doth vary 11 d. 15 m
one Point Eaſt.

*Example* 2.

True } Ampl. { 07 d. 0 m. Eaſt North
Magnet. } { 15 d. 30 m. Eaſt Souther
Idem and the Variation of the Compaſs.

*By the* Rectifier.

Bring 15 d. 30 m. Eaſt Southerly on the
Compaſs, againſt 7 d. Eaſt Northerly on the
then North, on the firſt, ſtands againſt 22 d. 3
North Weſterly; that is, 22 d. 30 m. or 2 P
Variation Weſt.

# AN APPENDIX,

Containing the Uſe of

# Inſtruments

Moſt Uſeful in

# NAVIGATION.

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## *The Deſcription and Uſe of the* Fore-ſtaff, *or* Croſs-ſtaff.

THE *Foreſtaff*, ſo called from the Poſiture of the Obſerver in uſing it, whoſe Face is towards the Thing obſerved, generally; tho the Sun it's ſo contrived (for preſerving the Eye) be uſed backward: it's called a *Croſs-ſtaff* from Form, being a ſquare Staff with 3 or 4 pieces a- it, which are called *Croſſes*.

The

The Staff is uſually about 30 Inches, or 3[illegible] long, and more than half an Inch ſquare, having [illegible] ſides, each graduated unequally like a Scale of T[illegible] gents, to each of them belongs a diſtinct Croſs: [illegible] ſometimes the ſhorteſt Croſs is made to ſerve t[illegible] ſides of the Staff; that is, the Breadth is for the T[illegible] Croſs, and Length for the Thirty-Croſs: beſi[illegible] it hath 2 Croſſes more, the longeſt is the Ninet[illegible] Croſs, the other the Sixty-Croſs; theſe 4 Croſſes [illegible] thus to be underſtood: The

| | | d. | |
|---|---|---|---|
| 10 | Croſs, belongs to that | 3 | and ending at |
| 30 | ſide beginning at | 10 | |
| 60 | | 20 | |
| 90 | | 30 | |

## *The Uſe of the* Fore-ſtaff.

IT's common and ordinary at Sea, to take the M[illegible] ridian Altitude of the Sun or Stars with this I[illegible] ſtrument, and by it find the Latitude they are [illegible] To perform which, take notice of theſe Precepts f[illegible] lowing:

1. Note; The 10, 30, 60, and 90 Croſſes, are [illegible] be uſed according as the Meridian Altitude is m[illegible] or leſs; that is, if leſs than 10 d. uſe the 10 Cro[illegible] if between 10 and 30 d. uſe the 30 Croſs; if b[illegible] tween 30 and 60 d. the 60 Croſs; if more t[illegible] 60 d. uſe the 90 Croſs.

2. Having conſidered which Croſs (accordin[illegible] the judged Altitude of the Object intended to be [illegible] ſer[illegible]

The

is fu
the Cr
Then,

The Fig

Hold the flat end
ner of your Eye; th
e, as near the corn
doth not hinder yo
Then look to th
G) for the Sun, and
Horizon.
But if, at the low
y, and no Water
to your Eye.

...ridian, ...
... riſeth, draw ...

...ll not ſee the ...
... from you; and ...
... ſtir not the Croſ...
... *Degree*, &c. it re...
...onging to it; and ...
... Complement there...
... or *Comp.* on the St...

...oreſtaff *backward.*

... Sun, and for this ...
... another piece of ...
...t the lower edg...
...e middle of the ſ...
...ch alſo anſwers ...
... Staff.
...h a hole in it, ...
...d on the Ends ...
...e two things ad...
...ackward Obſer...

According as the Meridian Altitude of the Sun
ore or leſs, ſo uſe the 90, 60, or 30 Croſs; put-
it on the Staff, the flat end of it even with the
d of the Staff, there ſcrew it faſt; and at one
f the Croſs, ſlip on the foreſaid Braſs Plate, ſo
leave a ſlit ſight through it, near the lower end
e Croſs.

Put the Ten-Croſs (having a croſs piece on it)
e Staff, the flat ſide of it towards the other
, at the Staff's end.

Turn your back to the Sun; Look through the
ght, at the lower end of the Croſs, for the Sha-
of the upper end, lying on the Ten-Croſs, in
ine anſwering the middle of the Staff, and on
ide of the Staff.

At the ſame time, the Horizon ſhould be ſeen
ough the foreſaid ſlit) to lie even with the Sha-
on the middle Line, in the Ten-Croſs, at each
of it, on both ſides the Croſs.

In looking through the ſlit Sight, you ſee the
w on the middle Line; but inſtead of the Ho-
you ſee only Water there; then draw the Ten-
nearer, till the Shadow and Horizon agree or
in the ſaid middle Line.

On the contrary, looking as before, inſtead of
Horizon, you ſee Sky meet the Shadow, on the
le Line; then put the Ten-Croſs from you,
ou ſee the Horizon and Shadow meet at the

Continue obſerving till the Sun be at the high-
nd as the Sun riſeth, you muſt draw the Ten-

Croſs nearer, in order to keep the Horizon and Shadow together on the middle Line of it.

8. If the Sun be fallen, (after you have continued obſerving as before directed) the Horizon will be below the Shadow, on the middle Line; then is your Obſerving finiſhed at that time: ſtir not the Tenon Croſs out of its place; for where it now ſtands, on that ſide of the Staff belonging to the Croſs, at the end of it is the Sun's Meridional Altitude, or Complement thereof, as before in obſerving forward.

Thus I have ſhewed how to take an Obſervation by the Croſs-ſtaff, and that both forward and backward. The next thing in courſe will be to ſhew how to work your Obſervation; which to do, take notice of theſe following Rules.

## *To work an Obſervation.*

1. IF the Sun or Star hath North Declination, and be on the Meridian to the Southwards of you, ſubtract the Declination from the Meridian Altitude, and the Remainder is the height of the Equinoctial, or Complement of the Latitude North.

2. But if the Object obſerved hath South Declination, add, the Sum (if it exceed not 90 d.) is the height of the Equator, or Complement of the Latitude North: If it doth, ſubtract 90 d. from it, the Remainder is the Latitude South.

3. If the Object hath North Declination, and be on the Meridian to the Northwards; add the De-

nation to the Meridian Altitude, the Sum (if it exceed not 90 d.) is the height of the Equator, or Complement of the Latitude South: But if it doth exceed 90 d. ſubtract 90 d. from the ſaid Sum, the Remainder is the Latitude North.

4. If the Sun hath South Declination, and be to the Northwards at Noon, ſubtract the Declination from his Meridian Altitude, the Remainder is the Complement of the Latitude South.

5. When the Sun hath no Declination, the Meridian Altitude is the Complement of the Latitude North; if South, at Noon; and the contrary.

6. If the Sun be in the Zenith, and at the ſame time he hath no Declination, you are under the Equinoctial.

7. But if the Sun hath North or South Declination, and in the Zenith; the Declination is the Latitude you are in, North or South.

8. If you obſerve Sun or Star upon the Meridian, beneath the Pole, add the Meridian Altitude to the Complement of the Sun or Star's Declination; the Sum is the height of the Pole, or Latitude of the place.

Theſe 8 Rules are explained by the Examples following.

## *Examples for working an Obſervation in North Latitude.*

### *Example* 1.

ADmit, at Sea, I obſerve the Sun's Meridian Altitude to be 42 d. 20 m. South; and at the ſame time the Sun's Declination is 10 d. 10 m. North. I demand the Latitude I am in?

| | d. | m. | |
|---|---|---|---|
| The Meridian Altitude | 42 | 20 | South |
| The Declination —— ſubt. | 10 | 10 | North |
| The Complement of the Latitude | 32 | 10 | |
| Subtract it from | 90 | 00 | |
| The Latitude I am in, is | 57 | 50 | North |

### *Example* 2.

Being at Sea the 22*d* of *May*, *Anno* 1692. I find the Sun's Meridian Altitude to be 65 d. 10 m. South. I demand the Latitude?

| | d. | m. | |
|---|---|---|---|
| The Meridian Altitude | 65 | 10 | South |
| The Declination —— ſubt. | 22 | 15 | North |
| The Complement of the Latitude | 42 | 55 | |
| Subtract it from | 90 | 00 | |
| The Latitude I am in, is | 47 | 05 | North |

*Exa*

*Example* 3.

At Sea the 27*th* Day of *November*, *Anno* 1695. find the Sun's Meridian Altitude to be 26 deg. 0 min. South; I demand the Latitude I am in?

| | d. | m. | |
|---|---|---|---|
| The Meridian Altitude | 26 | 30 | South. |
| The Declination — add | 22 | 44 | South. |
| The Complement of the Latitude | 49 | 14 | |
| Subtract it from | 90 | 00 | |
| The Latitude I am in, is | 40 | 46 | North. |

*Example* 4.

At Sea the 25*th* of *April*, *Anno* 1693. I find the Sun's Meridian Altitude, by observation, to be 58 d. 15 m. South; I demand the Latitude I am in?

| | | | |
|---|---|---|---|
| The Meridian Altitude | 85 | 45 | South. |
| The Declination — subt. | 16 | 31 | North. |
| The Complement of the Latitude | 42 | 14 | |
| Subtract it from | 90 | 00 | |
| The Latitude I am in, is | 47 | 46 | North. |

*Example* 5.

Admit, the 12*th* Day of *June*, *Anno* 1697. I find the Sun's Meridian Altitude, by observation, to be 60 d. 35 m. North; I demand the Latitude I am in?

| | d. | m. | |
|---|---|---|---|
| The Meridian Altitude | 80 | 35 | North. |
| The Declination — add | 23 | 31 | North. |
| The Sum exceeds 90 deg. | 104 | 00 | |
| From it ſubtract | 90 | 00 | |
| The Latitude I am in, is | 14 | 06 | North. |

*Example 6.*

Admit, *Auguſt* 22, 1699. the Sun's Meridian Altitude was obſerved to be 85 d. 15 m. North; I demand the Latitude of that Place?

| | d. | m. | |
|---|---|---|---|
| The Meridian Altitude | 85 | 15 | North. |
| The Declination — add | 08 | 17 | North. |
| The Sum exceeds 90 deg. | 93 | 32 | |
| Therefore from it ſubtract | 90 | 00 | |
| The Latitude of that Place is | 3 | 32 | North. |

*Example 7.*

Admit, in a Ship at Sea, *June* 20, 1695. the Sun's Meridian Altitude was 66 d. 45 m. North; I demand the Latitude the Ship is in?

| | d. | m. | |
|---|---|---|---|
| The Meridian Altitude | 66 | 45 | North. |
| The Declination — add | 23 | 15 | South. |
| Complement of the Latitude, | 90 | 00 | |
| Subtract it from | 90 | 00 | |
| The Ship is under the Equinoctial | 0 | 00 | |

Exa

## *Examples to find the Latitude, by observing the Stars.*

### *Example* 1.

ADmit, at Sea, I observe the *Bull's Eye* upon the Meridian, and find his Meridian Altitude to be 50 d. 30 m. South; I demand the Latitude I am in?

| | d. | m. | |
|---|---|---|---|
| The Declination of this Star, the *Bull's Eye*, is | 15 | 46 | North. |
| The Meridian Altitude of the Star | 50 | 30 | South. |
| The Declination — subt. | 15 | 46 | North. |
| Complement of the Latitude, is | 34 | 44 | |
| Subtract it from | 90 | 00 | |
| The Latitude I am in, is | 55 | 16 | North. |

### *Example* 2.

Admit I observe the bright Star in the *Great Dog's Mouth*, and I find his Meridian Altitude to be 35 d. 45 m. South; I demand the Latitude I am in?

| | d. | m. | |
|---|---|---|---|
| The Declination of the *Great Dog's Mouth*, is | 16 | 15 | South. |
| The Meridian Altitude of the Star | 35 | 45 | South. |
| The Declination — add | 16 | 15 | South. |
| The Height of the Equator, is | 52 | 00 | |
| Subtract it from | 90 | 00 | |
| The Latitude I am in, is | 38 | 00 | |

*Examples for working an Observation in South Lat.*

*Example* 1.

ADmit in a Ship at Sea the 10*th* Day of *May*, *Anno* 1694. I find the Sun's Meridian Altitude, by Observation, to be 62 d. 00 m. North; I demand the Latitude the Ship is in?

| | d. | m. | |
|---|---|---|---|
| The Meridian Altitude | 62 | 00 | North. |
| The Declination — add | 20 | 08 | North. |
| The Complement of the Latitude | 82 | 08 | |
| Subtract it from | 90 | 00 | |
| Latitude the Ship is in, is | 7 | 52 | South. |

*Example* 2.

Admit, in a Ship the 15*th* Day of *January*, *Anno* 1692. in Longitude 150 d. East, I find the Meridian Altitude, by Observation, to be 58 d. 45 m. North; I demand the Latitude the Ship is in?

The Declination in the Meridian of *London*, for the 15*th* of *January* is 18 d. 57 m. the daily Difference at this time is 15 m. decreasing; therefore (in the Table of Proportion) you will find the proportional Minutes to be 6 m. which add to the Declination in the Meridian of *London*, the Sum is 19 d. 3 m. South; the true Declination for the Longitude of 150 d. East.

| | | | |
|---|---|---|---|
| The Meridian Altitude | 58 d. | 45 m. | N. |
| The Declination — subt. | 19 d. | 03 m. | S. |
| Complement of the Latitude, is | 39 | 42 | |
| Subtract it from | 90 | 00 | |
| Latitude the Ship is in, is | 50 | 18 | S. |

Exam-

*Example* 3.

Admit, being at Sea the 12*th* Day of *July*, *Anno* 1693. I find the Sun's Meridian Altitude to be 66 d. 52 m. North; I demand the Latitude?

| | d. | m. | |
|---|---|---|---|
| The Meridian Altitude —— | 66 | 52 | North. |
| The Declination —— add | 20 | 14 | North. |
| Complement of the Latitude, is — | 87 | 06 | |
| Subtract it from —— | 90 | 00 | |
| The Latitude required —— | 2 | 54 | South. |

*Example* 4.

A Ship at Sea, the Sun's Declination being 15 d. 20 m. South, and the Sun's Meridian Altitude 80 d. 35 m. South; I demand the Latitude the Ship is in?

*Answ.* 6 d. 15 m. South.

*Example* 5.

The Sun's Declination being 11 d. 14 m. South, and the Sun's Meridian Altitude 79 d. 38 m. South; I demand the Latitude?

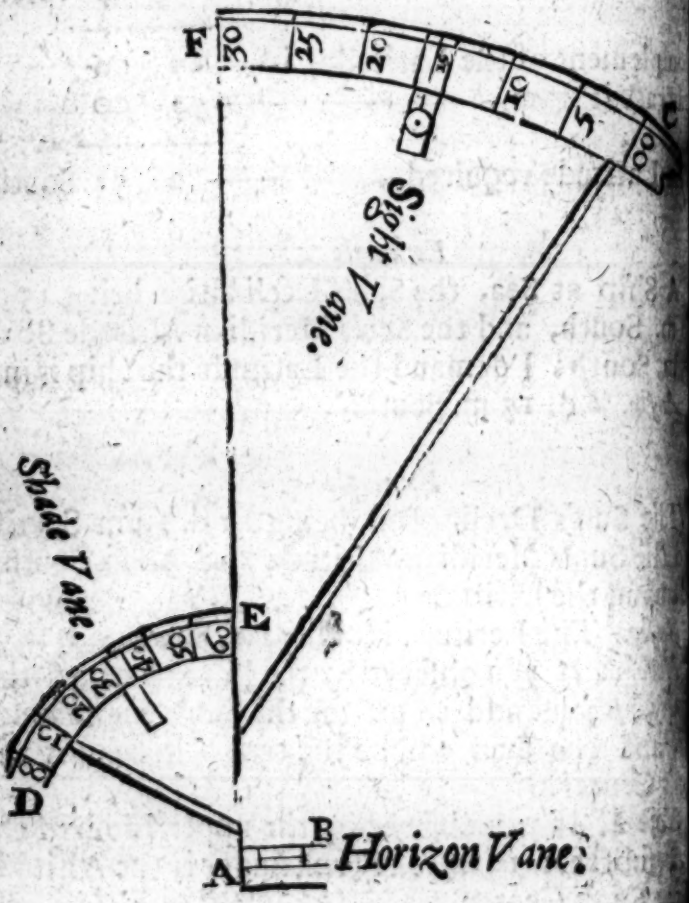
*Answ.* The Latitude is 0 d. 52 m. South.

*Note* 1. If you observe by the lower part of the Sun, you must add 16 m. for the Sun's Semidiameter, and the Sum will be the true Altitude of the Sun's Center.

*Note* 2. If you observe by the upper Limb of the Sun, subtract 16 m. the Remainder is the Altitude of the Sun's Center.

The

# The Figure of the QUADRANT.



# The Deſcription and Uſe of the QUADRANT.

## *The Deſcription of* Davis's *Quadrant.*

THIS Inſtrument, called a *Quadrant*, firſt invented by our Countryman, Capt. *Davis*, and thence called *Davis*'s Quadrant, is of ery commodious Form; at preſent, the moſt geral approved Inſtrument at Sea, for obſerving the 's Meridian Altitude.

The Form of it (as in the Figure prefixed) may of any Radius, and are made of any Length beeen 18 Inches and 3 Feet; but the moſt general w made, are *QUADRANTS of 26 Inches Radius, h one Arch 65 Degrees, the other 25, and a Glaſs in Shadow Vane.*

The principal Parts are Vanes, and 2 Arches; which Arches are the Degrees, both together maing 90 Degrees; from whence it hath the Denonation of a *Quadrant.*

### *Of the 3 Vanes.*

The *Horizon Vane* (marked in the foregoing Fire AB, and with its name) reſpects the Horizon time of obſerving; that which gives the Shadow,

is

is named the *Shadow Vane*; and that through wh you are to look for both Shadow and Horizon, termed the *Sight Vane*: All these are noted in t Figure by their names.

*Of the 2 Arches.*

The lesser noted DE, is called the 60*th Arch*, b cause it did heretofore contain no more, and is numbred in the Figure; but now it often conta 65, and sometimes 70 Degrees: this Arch is of small Radius, being so designed, that the *Sha Vane* used on it, being at so small a distance from t *Horizon Vane*, on which its Shadow (in time of serving) is to fall, might be more visible to the of the Observer.

This *little Arch* is divided sometimes but to e 5 Degrees, and never less than every single Deg it's numbred from the upper end D, with 5, 10, 20, *&c.* downwards to E, where it ends in the AEF, (a Line in the middle of the longer *Leg* o *Quadrant*) at 60, 65, or 70 *Degrees*, according the other Arch is divided; so that the Numbe E and F together, ever must make 90 d.

The *greater Arch* CF, is called the 30*th* Ar it's of a large Radius, that it might contain the Subdivisions of a Degree; and being of a con tent Breadth, thereon usually are described 10 *centrick Circles*, intersected with 3 Diagonal L in each Degree, making each Intersection 2 Min

This *great Arch* is divided on the Limb into grees by long Stroaks; each again subdivided 6 equal parts by shorter Stroaks; each small Div being 10 Minutes, and are numbred from the

C, with 5, 10, 15, *&c.* upward to F, where it
in the Line A, E, F, at 20, 25, or 30 Degrees;
Figures at F and E, always together, muſt make
; as in the Figure are 30 and 60.

## *The Uſe of the* Quadrant.

His Inſtrument is rarely uſed otherwiſe than to
obſerve the Sun's Meridian Altitude; which
perform, I thus deſcribe.

1. Put the *Horizon Vane* A B, on the end A, and
e to the Center A; the *Sight Vane* put on the
ch C F, cloſe to the back of it; the *Shadow Vane*
the little Arch D E, home to the back of it, and
upper edg of the Vane ſet to a number of De-
leſs than the Complement of the Altitude by
or 20 Degrees.

2. The Vanes being thus fixed upon the *Quadrant*,
ing your Back towards the Sun, the end C in
r Hand, and F uppermoſt, look through the
t *Vane*, cauſing the upper edg of the Shade of the
dow *Vane* to lie upon the upper edg of the Slit in
*Horizon Vane*, where is drawn a black Line; at
ſame time, if the *Horizon* appear through the ſaid
in the *Horizon Vane*, the Vanes on the Quadrant
d at the Sun's preſent Altitude.

3. But if the Sky appear inſtead of the Horizon,
the Sight Vane a little higher towards F: on
contrary, if the Sea appear inſtead of the Hori-
, then ſlide the Sight Vane lower towards C;
tinue ſo to do, till the Horizon appear through
Horizon Vane.

4. In

4. In order to obtain the Meridian Altitude (which is the greateſt the Sun will have that Day, and the thing uſed to find the Latitude) continue obſerving; and as the Sun riſes, the Sea will appear through the *Horizon Vane*; and the Sight Vane muſt be ſlid lower accordingly: thus do, obſerving as often as may be convenient, till the Sun is at the higheſt.

5. When the Sun begins to fall, the Sky will appear (through the *Horizon Vane*) inſtead of the *Horizon*, then deſiſt obſerving for that Day.

6. Having thus done, add the Degrees the upper edg of the Shadow Vane ſtandeth at, to the Degrees and Minutes cut by the inſide of the Sight Vane; their Sum is the Complement of the Sun's Meridian Altitude, or the Diſtance of the upper edg of the Sun from the Zenith; to which Sum add 16 m. the Sun's Semidiameter; and this laſt Sum is the Diſtance of the Sun's Center from the Zenith, being the true Complement of the Sun's Meridian Altitude.

*Note*; The upper edg of the Shade of the Shadow Vane reſpects the upper limb of the Sun; and the lower edg of the ſaid Shade, anſwers to the lower limb of the Sun: ſo that obſerving by the firſt, you are to add 16 m. On the contrary, obſerving by the latter, ſubtract 16 m. to or from what's on the *Quadrant*; the Sum, or Difference, is the Diſtance of the Sun's Center from the Zenith called his *Zenith Diſtance*, or Complement of his Meridian Altitude.

The

Thus I have ſhewed how to take an Obſervation with the *Quadrant*; I come now to ſhew how to work it. The Difference in working an Obſervation taken by the *Foreſtaff* and the *Quadrant*, is only this: By the *Foreſtaff* you take the Altitude, by the *Quadrant* the Complement of the Altitude, or the Diſtance of the Sun from the Zenith: Altitude is the Diſtance of the Sun from the Horizon; therefore if you ſubtract the Complement of the Altitude from 90 d. the Remainder is the Altitude, which you may uſe as in the Uſe of the *Foreſtaff*.

But it is uſual to work Obſervations (made by the Quadrant) by the Complement of the Sun's Meridian Altitude; I will therefore give ſome general Rules, and ſome particular Examples for their Explanation.

## *The general Rules are:*

1. IF the Sun hath North Declination, and upon the Meridian to the Southwards; add the *Sun's Declination* to the *Zenith Diſtance*, (or Complement of the Sun's Meridian Altitude) the Sum is the Latitude you are in, North.

2. If the Sun be to the Southward of you, and hath South Declination, ſubtract the *Sun's Declination* from the *Zenith's Diſtance*, the Remainder will be the Latitude you are in, North: But if the Declination exceed the Zenith Diſtance, ſubtract the leſſer from the greater, and the Remainder is the Latitude South.

3. If

3. If the Sun be to the Northward of you, and hath South Declination; add the Sun's Declination to his Zenith Diſtance, the Sum will be the Latitude you are in the South.

4. If the Sun be to the Northward of you, and hath North Declination; ſubtract the Sun's Declination from his Zenith Diſtance, the Remainder will be the Latitude South: But if the Declination exceed the Zenith Diſtance, ſubtract the leſſer from the greater, and it gives the Latitude South.

I might have been larger in giving more general Rules; but if you underſtand thoſe 8 Rules for the Uſe of the *Foreſtaff*, you cannot err in theſe, uſing the *Quadrant*: And for their explanation, the Examples follow.

## *The Rules explained by Examples of obſerving in North Latitude.*

### *Example* 1.

ON the 10*th* of *April* 1692. being at Sea, the Sun came to the Meridian in the South; and by Obſervation, found his *Zenith Diſtance*, or *Complement of his Meridian Altitude*, to be 34 d. 47 m. that is, his upper limb was ſo much from the Zenith. I demand the Latitude of the Place of Obſervation?

| | d. | m. | |
|---|---|---|---|
| *Complement of Meridian Altitude* —— | 34 | 47 | |
| *The Sun's Semidiameter* —— add | 0 | 16 | |
| *Diſt. of the Sun's Center from Zenith* | 35 | 3 | South |
| *Declination North* —— —— add | 11 | 55 | North |
| *Latitude of the Place required* —— —— | 46 | 58 | North |

*Exa-*

*Example 2.*

Being at Sea the 14*th* Day of *August*, *Anno* 1692. I find the Complement of the Sun's Meridian Altitude, by Observation, to be 28 d. 48 m. South; I demand the Latitude the Ship is in?

| | d. | m. | |
|---|---|---|---|
| Complement of Meridian Altitude— | 28 | 48 | South. |
| Sun's Semidiameter ——— add | 00 | 16 | |
| Dist. of Sun's Center from Zenith — | 29 | 04 | South. |
| The Declination ——— add | 10 | 52 | North. |
| Latitude the Ship is in, ——— | 39 | 56 | North. |

*Example 3.*

Being at Sea *September* 13, 1694. I find the Complement of the Sun's Meridian Altitude by Observation, to be 47 d. 35 m. South; I demand the Latitude I am in?

| | d. | m. | |
|---|---|---|---|
| Complement of Meridian Altitude-- | 47 | 35 | |
| Sun's Semidiameter ——— add | 00 | 16 | |
| Dist. of Sun's Center from Zenith— | 47 | 51 | South. |
| The Declination ——— subt. | 00 | 13 | South. |
| Latitude the Ship is in ——— | 47 | 38 | North. |

*Example 4.*

In a Ship at Sea the 5*th* Day of *November*, *Anno* 1693. I find the Complement of the Sun's Meridian Altitude, by Observation, to be 52 d. 0 m. South; I demand the Latitude the Ship is in?

| | d. | m. | |
|---|---|---|---|
| Complement of Meridian Altitude— | 52 | 00 | |
| Sun's Semidiameter ——— add | 00 | 16 | |
| Dist. of Sun's Center from Zenith— | 52 | 16 | So |
| The Declination ——— subt. | 18 | 45 | So |
| Latitude the Ship is in, ——— | 33 | 31 | North. |

*Example* 5.

Being at Sea the 27*th* of *May*, 1692. the Sun to the Northward of me; and the Complement of Meridian Altitude by Observation, to be 10 d. 15 m. I demand the Latitude the Ship is in?

| | d. | m. | |
|---|---|---|---|
| Sun's Declination ——— | 22 | 49 | North |
| Complement of Meridian Altitude-- | 10 | 15 | |
| The Sun's Semidiameter ——— add | 00 | 16 | |
| The true Zenith distance ——— subt. | 10 | 31 | North |
| Latitude the Ship is in ——— | 12 | 18 | North |

*Example* 6.

Admit, being in a Ship at Sea the 29*th* Day of *June*, *Anno* 1695. the Sun upon the Meridian, I find by Observation, the upper limb of the Sun is 42 m. to the Northward of my Zenith; I demand the Latitude I am in?

| | d. | m. | |
|---|---|---|---|
| Sun's Declination ——— | 22 | 26 | North |
| Sun's Semidiameter ——— add | 00 | 16 | |
| Sun's supreme Marg. dist. from Zen.- | 06 | 42 | |
| Dist. of Sun's Center from Zen. *subt.* | 06 | 58 | North |
| Latitude the Ship is in, ——— | 15 | 28 | North |

Ex

*Example 7.*

Being at Sea the 21*st* of *July*, *Anno* 1694. in Longitude 165 d. West, and the Sun being upon the Meridian, I find, by Observation, the supreme Margin of the Sun is 16 d. 45 m. to the Northward of my Zenith; I demand the Latitude the Ship is in?

| | | d. | m. | |
|---|---|---|---|---|
| The Declination | | 18 | 15 | North. |
| Proportional Minutes | subt. | 00 | 06 | |
| Sun's Declination in the Merid. given | | 18 | 09 | North. |
| Sun's supreme Marg. Dist. from Zen. | | 16 | 45 | |
| Sun's Semidiameter | add | 00 | 16 | |
| Sun's Center distant from Zenith | | 17 | 01 | North. |
| Latitude the Ship is in, | | 01 | 08 | North. |

## *The Rules explained by Examples of Observation in South Latitude.*

*Example 1.*

IN a Ship at Sea the 15*th* Day of *July*, *Anno* 1691. in Longitude 150 d. East, and the Sun being upon the Meridian, I find the Complement of his Meridian Altitude, by Observation, to be 48 d. 28 m. North; I demand the Latitude the Ship is in?

| | | d. | m. | |
|---|---|---|---|---|
| Complement of Meridian Latitude | | 48 | 28 | |
| Sun's Semidiameter | add | 00 | 16 | |
| Sun's Center distant from Zenith | | 48 | 44 | North. |
| The Declination | subt. | 19 | 47 | North. |
| Latitude the Ship is in, | | 28 | 57 | South. |

*Example* 2.

At Sea the 25th of *October*, *Anno* 1693. in Longitude 120 d. West, and the Complement of the Sun's Meridian Altitude, by Observation, is 27 d. 29 m. North; I demand the Latitude the Ship is in?

| | d. | m. | |
|---|---|---|---|
| Complement of Meridian Altitude-- | 27 | 29 | |
| Sun's Semidiameter ——— add | 00 | 16 | |
| Sun's Center from the Zenith——— | 27 | 45 | North. |
| The Declination ——— add | 15 | 46 | South. |
| Latitude the Ship is in, ——— | 43 | 31 | South. |

*Example* 3.

Admit being in a Ship at Sea the 25th of *December*, *Anno* 1694. I find the Sun upon the South part of the Meridian, and, by Observation, the Complement of the Sun's Meridian Altitude 15 d. 10 m. I demand the Latitude the Ship is in?

| | d. | m. | |
|---|---|---|---|
| Complement of Meridian Altitude-- | 15 | 10 | |
| Sun's Semidiameter ——— add | 00 | 16 | |
| Sun's Center from the Zen. —— subt. | 15 | 26 | South. |
| The Declination ——— | 22 | 45 | South. |
| Latitude the Ship is in, ——— | 07 | 19 | South. |

Thus much I thought necessary to add by way of explanation of the foregoing Rules, which shew a perfect way of observing; that is, how to take and work an Observation with more exactness than hath been formerly used.

*Note*

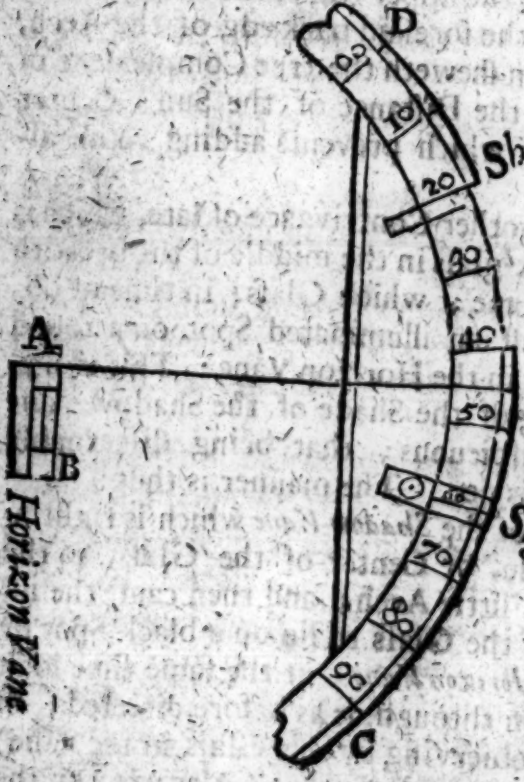
*Note* 1. The Sun's Semidiameter, here added to the Complement of its Meridian Altitude, may be contrived ſo on the Quadrant, that its Addition by the Pen may be omitted; for this purpoſe the Quadrants made by *James Atkinſon* at Cherry-Garden-ſtairs on *Rotherhith-Wall*, have on the back edg of the little Arch, every 5 d. numbred, differing from thoſe on its flat ſide, the Semidiameter of the Sun: So that by placing the upper edg of the Shadow Vane to the Degree on the foreſaid back edg of the Arch, the Quadrant then ſheweth the true Complement of the Altitude, or the Diſtance of the Sun's Center from the Zenith; which prevents adding 16 m. after obſerving.

2. There is another Contrivance of late, which is putting a Convex-glaſs in the middle of the breadth of the Shadow Vane; which Glaſs, in time of obſerving, is to caſt an illuminated Spot on a round black Spot made in the Horizon Vane: This is uſeful when the edg of the Shade of the Shadow Vane is not very conſpicuous; that being diſcernable when the latter is not. The manner is thus:

Set that part of the *Shadow Vane* which is right againſt the middle, or Center of the Glaſs, to the Degrees on the little Arch; and then cauſe the inlightned Spot of the Glaſs to lie on a black Spot or Circle on the *Horizon Vane*; at the ſame time look for the Horizon through it as before directed; ſo will you have (obſerving by this Glaſs in the Vane) the true Complement of the Sun's Altitude, or the Diſtance of his Center from the Zenith.

## The Figure of the

# BOW.



# *The Description and Use of the* BOW.

## *The Description of the* Bow.

THIS Instrument consisteth of two parts, (making the Figure ACD) besides the 3 Vanes which are the same for kind with those used with the Quadrant: The Parts are the Arch CD, and the Radius AE; this latter slips in a Socket, so as to be taken out, for convenience, to lie in a little room.

The 3 Vanes are the same as before described to the Quadrant, and their Names are inserted in the Figure of the Bow prefixed.

The Degrees are numbred from the upper end of the Arch D, downwards towards the lower end C, thus, 5, 10, 15, *&c.* as in the Figure: The Use of it follows.

## *The Use of the* Bow.

1. TAke the lower end of the Bow C in your Hand, (after the Vanes are placed according to the Directions before in using the Quadrant) holding it upright; look through the *Sight Vane*, causing the upper edg of the Shade of the Shadow Vane, to lie on the upper edg of the Slit in the Horizon Vane; and at the same time look for the Horizon through it, sliding the Sight Vane higher or lower, (as directed in the Use of the Quadrant) till

the Shadow and Horizon meet together on the Horizon Vane.

2. Continuing your Observation (as with a Quadrant) till the Sun be at the highest; and when he is fallen, you may know it thus: Keeping the Shadow on the Slit of the *Horizon Vane*, and looking through it, you see the *Sky* instead of the *Horizon*, the Sun is then fallen, and your Observing for that Day is over.

3. Then count the Degrees intercepted between the Sight and Shadow Vane, (that is, from the upper edg of the Shadow Vane, to that part of the Sight Vane right against the middle of the Eye-hole in it) they shew the Sun's Altitude: or thus; Subtract the Degrees at the Shadow Vane, from those at the (sight of the) Sight Vane, the Remainder is the Sun's Altitude, or Distance of his upper limb from the Horizon; from which, subtract 16 Minutes, and have you the Altitude of his Center: but if the Shadow Vane have a Glass in it, and the Observation be made by it, (as before directed, in its using with a Quadrant) the Instrument sheweth the true Altitude, without the Subtraction of 16 Minutes for the Sun's Semidiameter.

*To find the Latitude in Observing by the* Bow.

The same Rules given in observing by the Forstaff, are to be followed here; or subtract what the Bow sheweth from 90 d. and then the Rules for the Quadrant are to be observed, in order to find the Latitude.

The

# *The Description and Use of the* NOCTURNAL.

## *The Description.*

THE *Nocturnal* consists of 3 Parts; the first, termed the unmoveable Part, is the broadest and greatest; to which, is a handle to hold it by in time of Observation.

On the forefide of which, in the outermoft Circle, are the 12 Months, and each Month fubdivided into refpective Days, or at leaft every two Days: They are counted towards the right hand; marked with their Names, or the firft 3 Letters thereof; as *Jan.* for *January*, *Feb.* for *February*, *Mar.* for *March*, &c. Within the Circle of Months, is a Circle divided into 24 equal Parts or Hours, each Hour divided into Halfs and Quarters, ufed to find the time of *Full-fea* or *Low-water*.

On the backfide of this part, are the 32 Points of the Compafs, *South* uppermoft, and *Eaft* on the right hand; to each Point is fet the Declination of the *North Star*, above, or under the Pole; which is known by *Und.* for *Under*, and *Abo.* for *Above*.

There have formerly been made two forts of *Nocturnals*, one for the *Great Bear*, the other for the *Little Bear*: Thofe made for the Guards of the

*Great*

*Great Bear*, or *Charles's Wain*, commonly called t
2 *Pointers*, have *February* at the top: But th
made for the Guards of the *Little Bear*, have *Apri*
But they are now made for both *Bears* in one *N*
*turnal*; and are known by having either 2 Circle
Months, marked G B, and L B, or 2 short Teeth
Indexes, proceeding from the second or middle p
of it.

2. The second moveable or middle Part, hath
Circles on it; the outermost is divided into the
Days and $\frac{1}{2}$ of the *Moon's Age*; the innermo
24 equal Parts or *Hours*, each *Hour* subdiv
*Halfs* and *Quarters*: this part hath a Tooth o
Index proceeding from it, with the edg con
in a right line from the Center; which is to be
the Day of the Month when used: some ha
marked G on one, and L on t'other; G standing
*Great Bear*, and L for *Little Bear*; signifying
Nocturnal is made for both Bears, and may be
for either.

3. The third and moveable Part, is called
*Index*, it's uppermost on the foreside of the In
ment, having one edg proceeding in a right
from the Center, which (in time of Observa
must be turned to the Guards: Through all 3 p
in the Center of the Instrument, is a *Hole*, thro
which you are to see the *North-Star*, when the
dex is turned to the Guards.

## *The manner of using the* Nocturnal.

it may be found the Hour of the Night, the Bearing of the Guards, and the Declination of *North Star* from the Pole; by which may be the Latitude; as shall be shewed in order.

### 1. *To find the Hour of the Night.*

Place the Index of the second, or middle Piece, Day of the Month, where it's to be kept till Observation is ended: Then, taking the Handle Hand, with the foreside towards you, And holding it upright (which you may dis- when you do so, by the tip on the top of the great Part of the Nocturnal) look through le in the Center for the *North Star*.

Turn that edg of the long Index, which pro- th from the Center, to the Guards, seeing at same time the *North Star* through that Hole: will the Index shew the Hour of the Night on second or middle Part.

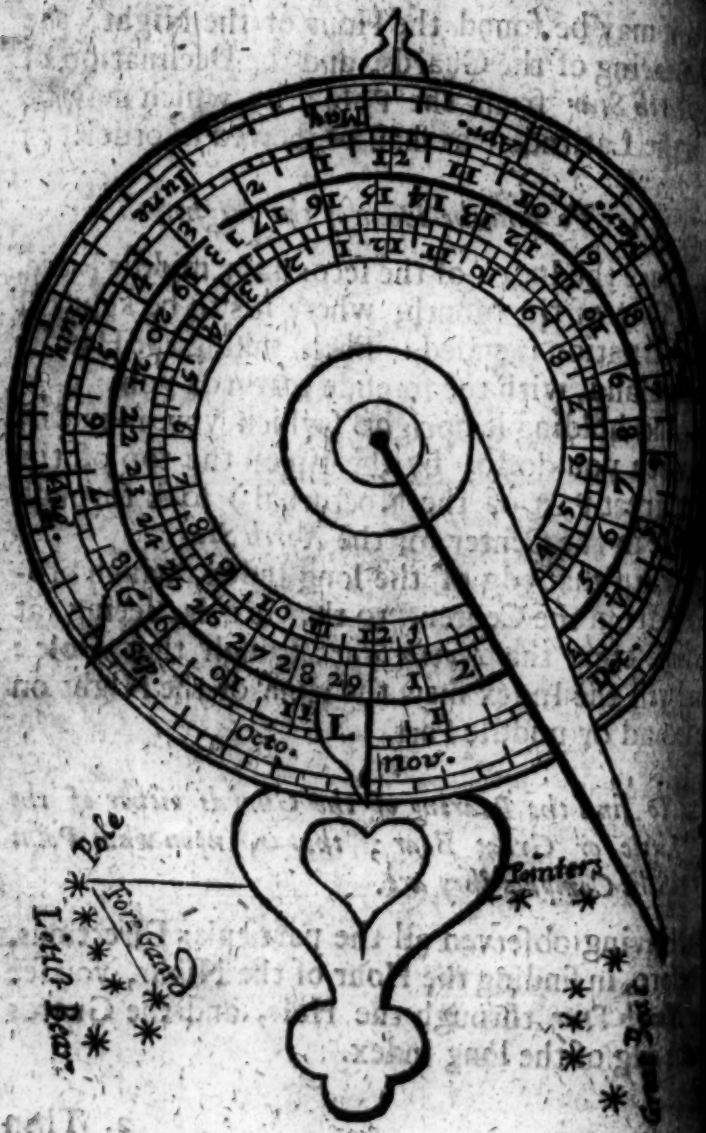
### *To find the Bearing of the Guards either of the Little or Great Bear; that is, upon what Point of the Compass they are.*

Having observed all the particular Directions, before, in finding the Hour of the Night, you see *North Star* through the Hole, and the Guards e edg of the long Index.

2. Then

The Figure of the

# NOCTURNAL



Then look on the backſide of the Nocturnal, Point of the Compaſs ſtandeth againſt the id edg of the Index; which is the Bearing *Guards*; and at the ſaid Point of the Com- is figured the *North Star's Declination from the* at that time, either above or under.

*Example* 1.

The 20th *of* December, *at* 6 *of the Clock in the* ning, *obſerving the Pointers or Guards of the Great* by *the edg of the Index*; *I demand their Bearing,* Declination *of the North Star?*

ght againſt that edg of the Index (you ob- with) and on the backſide of the Nocturnal, W. by S. the Point of the Compaſs required: on the ſaid Point of the Compaſs is 1 *d.* 10 *m.* ſignifying the *North Star* is then 1 *d.* 10 *m.* the Pole.

*Example* 2.

The 14th *of* February, *I obſerve* (*according to the* ctions *before given*) *at* 7 *a Clock in the Evening,* Guards *of the Little Bear by the edg of the long* ex; *I demand their Bearing, and Declination of* North *Star?*

Seeing the *North Star* through the Hole in the dle, and the Guards of the Little Bear by the of the long Index (note that edg reſpecting the er of the Inſtrument) and the Index cutting 7 the Clock in the middle part; then on the back- of the Nocturnal, and againſt the ſaid edg of the Index,

Index, is N. E. the Point of their Bearing; and the said Point is figured 0.35. *Abo.* which signifieth the *North Star* is then 35 Minutes above the Pole.

3. *To find the Moon's Southing by the Nocturnal.*

To do this, look the Moon's Age in the outermost Circle, on the middle or second piece of the Nocturnal; and right against it, in the innermost Circle of the same Piece, is the Southing.

Example.

*If the Moon be* 19 *Days old; I demand her Southing?*

Right against 19, in the outermost Circle, is 3 in the innermost Circle; which is half an Hour past 3 of the Clock in the Morning, the time of the Moon's coming to the South.

4. *To find the time of Full-sea by the Nocturnal.*

1. Find the Moon's Southing according to her Age as before directed.

2. Set the short Index of the middle Part (if you have 2 Indexes, that which stands at 12) to the time of Full-sea on the New, or Full-Moon (for the Place proposed) in the innermost Circle of the great Piece.

3. Keeping that there, bring the long Index to the Southing, or Moon's Age on the middle Piece.

4. Then right against the long Index, and in the innermost Circle on the great Piece, is the time of Full-sea required.

Exam-

Example.

*Moon being* 19 *Days old; I demand the time of* [illegible] *at* Gravesend?

By the third Use find the Moon's Southing, which is $3\frac{1}{2}$ Hours in the Morning.

Bring the Index or Tooth of the middle Part (which stands at 12) to $1\frac{1}{2}$ Hour, which is (N.N.E. or S.S.W.) the Point of the Compass making Full-and-Change at *Gravesend* on the New, or Full-Moon, in the outmost Circle of 24 Hours on the great Piece. Observing that fast there,

Turn the long Index to 19 Days, the Moon's Age, or to $3\frac{1}{2}$ Hours, the Moon's Southing, on the middle Piece.

Then right against the long Index, and in the outmost Circle on the great Piece, is 5 Hours; the Time of Full-sea, or High-water, in the Morning at *Gravesend*.

*To find the Latitude, by the Nocturnal, and Forestaff.*

Find the North Star's Declination from the Pole by observing with the Nocturnal, as directed in Example 1 and 2, of the 2*d* Use.

Then (at the same time) with a Forestaff take the Altitude of the *North Star*.

If the North Star be above the Pole, subtract the Declination from, if under, add it to its Altitude; the Sum, or Difference, is the Latitude required.

Example

*Example* 1.

*Suppose the* 14th *of* February, *at* 7 *of the Clock in the Evening, observing with the* Nocturnal, *find the Guards of the* Little Bear *to bear N. E. which is* 35 m. *above the Pole; and at the same time, by the* Forestaff, *find the Altitude of the* North Star 42 d. 10 m. *I demand the Latitude of the Place?*

| | d. | m. |
|---|---|---|
| From the Altitude of the North Star | 42 | 10 |
| Subtract its Declination above —— | 0 | 35 |
| Remainder is the Latitude required-- | 41 | 35 N. |

*Example* 2.

*The* 20th *of* December, *at* 6 *of the Clock in the Morning, observing with the* Nocturnal, *I find the Guards or Pointers of the* Great Bear *S. W. by S. and is* 1 d. 10 m. *under the Pole; and at the same time, by the* Forestaff, *find the Altitude of the* North Star 45 d. 22 m. *I demand the Latitude of the Place by Observation?*

| | d. | m. |
|---|---|---|
| To the Altitude of the North Star— | 45 | 22 |
| Add its Declin. from the Pole under -- | 1 | 10 |
| Sum is the Latitude required—— | 46 | 32 N. |

## The Description and Use OF *Gunter's* SCALE.

THIS Instrument, for its quick and easy dispatch of the most common and useful Proportions, deserves as generally to be known its Uses, as by its Name: On that account, I'll ch a little on its Description, before I give you of its manifold Uses; and all as brief and plain tan.

### *The Description of* Gunter's *Scale.*

GUnter's Scale, (so called from Mr. *Gunter* its first Contriver) usually made of Boxwood, Scale, or Ruler of any Length and Breadth, (but monly 2 Feet long, and 1 ½ Inch broad) on ich are the Lines or Scales of Numbers, Sines, angents, *&c.* Of which are 2 sorts, the *long Gun-* or *single Gunter*, and the *sliding Gunter*; on h sorts are the same Lines, though differently d; the first with Compasses, the latter by sli-ng.

2. The Lines most usual now set on *Gunters* are and have their Names at the right hand end reof, under one another thus; *Sine-Rumb*, *Tang-*

*Rumb, Numbers, Sines, Verſed Sines, Tangents, Meridian* (for Meridional Parts) and *Equal Parts.*

3. The *Sine Rumb*, and *Tang. Rumb*, are both Points of the Mariners Compaſs; the firſt is figured from the left hand towards the right, with 1, 2, 3, 4, 5, 6, 7, and 8, at which is a braſs Center-pin; the latter is figured thus, 1, 2, 3, and 4, at the ſaid Center-pin, and thence back again towards the left hand with 5, 6, and 7; each Point in both Lines, where it can, is ſubdivided into Halfs and Quarters; theſe 2 Lines are chiefly uſeful in Navigation.

4. The next under *Tang. Rumb*, is the *Line of Numbers* figured thus; near the left hand end, it begins at 1, and on towards the right hand 2, 3, 4, 5, 6, 7, 8, 9; then 1 in the middle, at which is a braſs Center-pin; going ſtill on 2, 3, 4, 5, 6, 7, 8, 9, and 10, at the end, where is another Center-pin: This Line is of the moſt general Uſe, and requires the larger Account of it: wherefore take theſe following Notes for the *Line of Numbers.*

Note 1. *All the Figures on this Line may be taken ſingle as they ſtand; or be increaſed, or diminiſhed at pleaſure, ſo it be in decuple Proportion:* That is, the firſt 1 may be counted for 1, or 10, or 100, or 1000, *&c.* then the next 2 is accordingly 2, or 20, or 200, or 2000, *&c.* Again, the firſt 1 may be reckoned 1 tenth, or 1 hundredth, or 1 thouſand Part, *&c.* then the next 2 is 2 tenths, or 2 hundredths, or 2 thouſands Part, *&c.* So that,

If the firſt 1 be taken for 1, the middle 1 is then 10, and 2 to its right hand is 20, 3 is 30, 4 is 40, and 10 at the end is now 100: Again, if the firſt 1 be

be counted 10, the next 2 is 20, 3 is 30, and ſo on making the middle 1 now 100, the next 2 is 200, 3 is 300, 4 is 400, and 10 at the end is now 1000.

In like manner, if the firſt 1 be eſteemed for 1 tenth, the next 2 is 2 tenths, and the middle 1 is 1, and next 2 is 2, and 10 at the end is now 10: Again, if the firſt 1 be counted for 1 hundred Part, the next 2 is 2 hundredth Part, the middle 1 is now 10 hundredth Parts or 1 tenth Part, and next 2 is 2 tenth Parts, and 10 at the end is now but 1 whole Number or Integer.

Note 2. *As the Figures are increaſed, or diminiſhed in their Value, ſo in like manner muſt all the intermediate Stroaks or Subdiviſions, be increaſed, or decreaſed:* That is, if the firſt 1 (at the left hand) be counted 1, then 2 (on the right hand of it) is 2, and each Subdiviſion between them is now 1 tenth Part; and ſo all the way to the middle 1, which now is 10, the 2 next it, is 20; now the longer Stroaks between 1 and 2, are to be counted from 1 thus, 11, 12, (where is a braſs Pin) then 13, 14, 15, (ſomething a longer Stroak than the reſt) then 16, 17, 18, 19, and 20, at the Figure 2: And all the ſhorter Stroaks between theſe longer, are now, each to be counted for a tenth Part, from the middle 1 to the next 2 now 20; from whence the longer Diviſions, between the Figures, are Unites; thus, 21, 22, 23, *&c.* to 3 which is 30; and the ſhorter Diviſions between them, each now is $\frac{1}{2}$ or 2 tenths of an *Integer*; and ſo is it till you come to 4, which now is 40; from whence each ſhort Stroak or little Diviſion, is $\frac{1}{2}$ or 5 tenths of a *Unite*.

Again, if 1 at the left end be 10, the *Figures* between it and the middle 1, are common Tens, and the Subdiviſions (between each Figure) are *Unites*; and from the middle 1 to 10 at the end, each *Figure* is ſo many *Hundreds*; and between theſe *Figures*, each longer Diviſion, are *Tens*; and from the middle 1 to 2, each leſſer Diviſion, is a *Unite*; from 2 to 4, each leſſer Stroak, is 2 *Unites*; from the Figure 4 to the end, each ſhorter Stroak, is 5 *Unites*.

Note 3. *On the* Line of Numbers, *may be counted a Number of any Denomination:* whether Meaſure; as Inches, Feet, Yards, Miles, Leagues, *&c.* or Weight; as Hundreds, Pounds, Ounces, *&c.* or Money; as Pounds, Shillings, *&c.* or Time; as Years, Months, Days, Hours, *&c.* provided always the *Integer* be divided or ſuppoſed to be divided *decimally*.

I have inlarged beyond my firſt Intention, in the Deſcription of this Line; I'll endeavour brevity in what remains.

5. Next under *Numbers* is the Line of *Sines*, beginning at the left hand at 25 Minutes, and figured thus; 1, 2, 3, *&c.* to 10; then 20, 30, 40, *&c.* to 90, ending at the right hand, where is a braſs Center-pin: theſe Figures never change their Value nor Denomination, being here (and in all the other Lines under it) *Degrees*.

From the beginning of this Line to 10 Degrees, each *Degree* is divided into 12 Parts, by greater and leſſer Stroaks, making each 5 *Minutes*; from 10 *Degrees* to 20, each ſmaller Stroak is 10 *Minutes*; from 20 to 30, each is 15 *m.* from thence to 60, ſome

ſome are 20, but the moſt are 30 *m.* each leſſer Subdiviſion; and from 60 to 80, each Diviſion is a Degree; 80 and 90 are ſo near together, that it admits but one Stroak between, which is for 85 *Degrees.*

6. Next to, and a butting on the Line of *Sines*, is the *Verſed Sines*, beginning at the right hand (againſt 90 in the *Sines*) and from thence figured towards the left hand, thus, 10, 20, 30, 40, *&c.* ending at the left end at about 169 *Degrees*; the Subdiviſions are thus, from 10 to 30, each is 2 *Degrees*; from thence to 90, its ſingle *Degrees*; from thence to 120, its $\frac{1}{2}$ *Degrees*; and from thence to the end it's divided into $\frac{1}{4}$ *s.* or each 15 *Minutes.*

7. Under *Verſed Sines*, is the *Line of Tangents*, beginning at the left end, as the *Sines* do; from thence figured to the right hand thus, 1, 2, 3, *&c.* to 10; and ſo on, 20, 30, 40, and 45 at the right hand, where is a little braſs Center-pin, juſt under and even with that in the *Sines*; from thence back again, it's figured 50, 60, 70, 80, *&c.* to 89, ending at the left end, where it began at 1 Degree: The Subdiviſions of this Line, are (for the moſt) like thoſe of the *Sines*; ſo paſſing that, I proceed.

8. Next to the *Tangents*, and under it is the *Line of Meridional Parts*, beginning at the right hand, is figured thus, 10, 20, 30, *&c.* to the left hand, where it ends at 86 Degrees: This Line, with the Line of Equal parts under it, are uſed together, and only in that part of Navigation, called *Mercator*'s *Sailing*: the uppermoſt Line contains the Degrees of the Meridian, or Latitude, in a Mercatory Chart; and the lower, as the Equinoctial, the Degrees of Longitude.

9. Theſe 8 Lines now deſcribed, are ſet on the *Sliding Gunter*, but not in the ſame order, being ſome on one ſide, and ſome on t'other; alſo the Lines of Numbers, Sines and Tangents, are ſet double, that is, one on each ſide, as the middle piece ſlides: Which middle piece is ſo contrived, to ſlip to and fro eaſily, to ſlide out, and to be put in any ſide uppermoſt, in order to bring thoſe Lines together (or againſt one another) moſt proper for ſolving the Queſtion, wrought by the *Sliding Gunter*: Of which, let this ſhort Deſcription ſuffice; the following Uſes will ſupply what's here wanting, being in a manner Deſcriptions.

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## I. *The Uſe of* Gunter's *Scale, both ſingle and ſliding.*

IN order to a right underſtanding of the Uſes of this Scale, it's neceſſary to number well on them; that is, to find readily a Place repreſenting any given Number, and that chiefly on the Line of Numbers; which is as follows.

### PROB. I.

*To find a whole Number on the Line of Numbers.*

*The Rule.*

1. LOok the firſt Figure of the given Number among the figured Diviſions.

2. For

2. For the ſecond Figure, count ſo many Tenths (or of the longer Stroaks) from the figured Diviſion, towards the right hand, as are Unites in the ſaid ſecond Figure.

3. Then for the third Figure, count from the laſt Tenth (repreſenting the ſecond Figure) ſo many leſſer Stroaks (or Centeſms) as that Figure hath Unites.

4. In like many for the fourth Figure, count from the laſt Centeſm, ſo many thouſands (or leſſer Stroaks) as are *Unites* in it; and ſo on for more Figures, though four Figures or Thouſands, are as many as well can be diſcerned on a two foot Gunter.

5. This done, the laſt place is the Point where the propounded Number is repreſented.

Example 1.

*To find the Point in the Line of Numbers that doth repreſent* 12.

According to the Rule above, I take the Diviſion at the figure 1 (in the middle of the Line of Numbers) for the firſt figure of 12, the propounded Number; then for 2, the ſecond figure, I count two Tenths (or longer Stroaks) to the right hand from the ſaid Stroak at 1; and this laſt is the Point repreſenting 12, where (moſt commonly) is a ſmall braſs Center-pin, being often in uſe.

Example 2.

*Suppoſe the Point repreſenting* 22 *on the Line of Numbers, were required to be found.*

The firſt figure in the Number 22 being 2, I take the Diviſion at the figure 2 for it; and for the ſe-

cond Figure being 2, I count 2 Tenths onwards; and that is the Point repreſenting 22, at which (in ſome Gunters) is a braſs Center-pin.

Example 3.

*I deſire to know the Point on the Line of Numbers that doth repreſent* 144.

The firſt Figure being 1, I take the Diviſion at the middle 1 for it; the ſecond Figure being 4, I count 4 tenths onwards; and from thence count 4 Centeſms further for the third and laſt Figure; this laſt place is the Point repreſenting 144.

Example 4.

*Let it be required to find on the Line of Numbers, the Point repreſenting* 1728.

For the firſt Figure 1, take the middle 1; for the ſecond figure 7, count (as before) onward 7 tenths, and that is 700; then for 2, the third figure, count 2 Centeſms from the laſt, and it repreſents 20; laſtly, for the fourth figure 8, eſtimate 8 thouſand Parts from the laſt: This Point laſt found, repreſenteth 1728.

## PROB. II.

*To find a Fraction, or broken Number, on the Line of Numbers.*

THe Fractions to be found on this Line, ought always to be Decimal; as theſe, 1, 01, 001; 2, 02, 003, *&c.* that is, $\frac{1}{10}$, $\frac{1}{100}$, $\frac{1}{1000}$; $\frac{2}{10}$, $\frac{2}{100}$, $\frac{2}{1000}$, *&c.* either of Inches, Feet, Yards, Miles, or the like; alſo in Weight, or Time, or any other Denomination whatſoever.

So

ſo that all other Fractions muſt be reduced into imals, before they can be found on the Line of mbers; and being ſo reduced, they are expreſſed found upon this Line, as whole Numbers, by the le in *Prob.* I. and needs no Examples.

## PROB. III.

*To perform Multiplication by the Line of Numbers.*

*The Rule is*;

AS 1 is to the Multiplicand, ſo is the Multiplier to the Product.

Now to work this or any Proportion on the Gunter, this is

*A general Rule:*

1. Extend the Compaſſes from the firſt Term to ſecond.

2. That Extent (in the Compaſſes) laid the me way from the third Term, will reach to the rth Term, or Thing required.

*By the ſliding Gunter, thus*;

1. Set the firſt Term (counted on the ſliding or iddle piece) right againſt the ſecond Term, coun- on the fixed piece.

2. Then ſeek the third Term (always on the me the firſt Term was counted) on the ſliding part; nd againſt it, on the fixed part, is the fourth Term Thing required.

Example

Example 1.

*What is the Product of* 8 *multiplied by* 4?

The Analogy, or Proportion, is this;

As 1 is to 8, ſo is 4 to the Product.

Or it is,

As 1 is to 4, ſo is 8 to the Product.

1. *By the Gunter with Compaſſes.*

Extend the Compaſſes from 1 to 8; that Extent ſet from 4 (the ſame way), reacheth to 32 the Product of 8 multiplied by 4.

Or, the Extent from 1 to 4, being laid from 8 reacheth to 32, the Product, as before.

2. *By the ſliding Gunter.*

Set 1 (at the beginning on the middle or ſliding piece) right againſt 8 (on the fixed or outſide piece); then againſt 4 (on the firſt) is 32, (on the ſecond) the Product required.

Or, ſet 1 (as before) againſt 4, then againſt (on the firſt) is 32 (on the ſecond), the Product as before.

Example 2.

*What is the Product of* 16 *multiplied by* 5?

The Proportion to work it by, is this:

As 1 is to 5, ſo is 16 to the Product.

*By Gunter with Compaſſes, thus;*

The Extent from 1 to 5 reacheth from 16 to 80 the Product required.

*By ſliding Gunter, thus;*

Set 1 (on the middle piece) againſt 5 (on the outſide piece); then againſt 16 (on the firſt) is (on the ſecond) the Product required.

PROB

## PROB. IV.

*To perform Diviſion by the Line of Numbers.*

*The Rule or Proportion, is this;*

As the Diviſor is to 1, ſo is the Dividend to the Quotient.

### Example 1.

*If the Dividend be 64, and the Diviſor 4; what is the Quotient?*

To do this, the Proportion is;

As 4 is to 1, ſo is 64 to the Quotient.

*By Gunter with Compaſſes, thus;*

The Extent from 4 to 1, laid (the ſame way) from 64, reacheth to 16, the Quotient required.

*By ſliding Gunter, thus;*

Set 4 (on the middle piece) againſt 1 (on the ſtock piece); then againſt 64 (on the firſt) is 16 (on the ſecond); which is the Quotient required.

### Example 2.

*How often is* 144 *contained in* 1728?

To do this, the Proportion is this;

As 144 is to 1, ſo is 1728 to the Anſwer.

*By Gunter with Compaſſes, thus;*

The Extent from 144 to 1, reacheth from 1728 to 12, the Quotient or Anſwer required.

*By ſliding Gunter, thus;*

Set 144 (on the middle piece) againſt 1 (on the ſtock piece); then againſt 1728 (on the firſt) is 12 (on the ſecond), which is the Quotient required.

PROB.

## PROB. V.

*To reduce a vulgar Fraction to a Decimal, by the Line of Numbers.*

*To perform this, the Proportion is thus;*

AS the Denominator of the given Fraction is to its Numerator, ſo is 1 to the Decimal Fraction required.

Example.

*Suppoſe it be required to reduce* $\frac{3}{4}$ *(a Vulgar Fraction) into a Decimal Fraction?*

*Note*; A Decimal Fraction hath for its Denominator a 1, with as many Cyphers as its Numerator hath places: And the Proportion to find its Numerator, is thus;

As 4 is to 3, ſo is 1 to the Numerator of the Decimal Fraction required.

1. *By Gunter with Compaſſes, thus;*

The Extent from 4 to 3, reacheth (the ſame way) from 1 to 75, or $\frac{75}{100}$, the Decimal Fraction required.

2. *By ſliding Gunter, thus;*

Set 4 (on the middle piece) againſt 3 (on the outſide piece); then againſt 1 (on the firſt) is 75 or $\frac{75}{100}$ on the ſecond, the Decimal Fraction required to be found: So that 75 or $\frac{75}{100}$ is equal in value to $\frac{3}{4}$.

PROB.

## PROB. VI.

*Continual Proportion, or Geometrical Progreſſion; which is unto two given Numbers: To find a* 3d, 4th, 5th, *&c. Number in a continued Proportion, by the Line of Numbers.*

*The Analogy by which it is effected, is this;*

As the firſt Number given is to the ſecond, ſo is the ſecond to a third; and ſo is that third to the fourth; and ſo is that fourth to a fifth, *&c.*

Example.

*Let the two Numbers given be* 2 *and* 4; *unto which is required to find a* 3d, *a* 4th *proportional,* &c.

For the performance hereof, the Rule is thus; As 2 is to 4, ſo is 4 to a 3*d*; ſo is that 3*d* to a 4th, *&c.*

*By Gunter with Compaſſes, thus;*

The Extent from 2 to 4 reaches from 4 to 8, the 3*d*; and from 8 to 16, the 4*th*; and from 16 to 32, the 5*th* proportional Number; and ſo on to as many as you pleaſe: So that 2, 4, 8, 16, 32, *&c.* are Numbers in continued Proportion Geometrical, as is required.

*By ſliding Gunter, thus;*

Set 2 (on the middle piece) to 4 (on the next piece); then againſt 4 (on the firſt) is 8 (on the ſecond) for the 3*d* Proportional; and againſt 8 (on the firſt) is 16 (on the ſecond), the 4*th* Proportional; and in like manner again, 16 is 32 the 5*th* Proportional, as required.

PROB.

## PROB. VII.

*Of the Rule of 3 direct, or 3 Numbers given; to find a 4th in Direct Proportion, by the Line of Numbers.*

*The Analogy whereby this is performed, is thus;*

As the firſt Number is to the ſecond, ſo is the third to the fourth Number required.

### Example 1.

*If the Diameter of a Circle be 7 Inches, and the Circumference thereof 22; What is the Circumference of a Circle, whoſe Diameter is 14 Inches?*

To perform this, the Analogy is thus;

As 7 is to 22, ſo is 14 to the Circumference required.

*By Gunter with Compaſſes.*

The Extent from 7 to 22, laid (the ſame way) from 14, will reach to 44, the Circumference of a Circle, whoſe Diameter is 14; which was required.

*By ſliding Gunter, thus;*

Set 7 (on the middle piece) againſt 22 (on the outſide piece) then againſt 14 (on the firſt) is 44 (on the ſecond) which is the Circumference required.

### Example 2.

*If the Circumference of a Circle be 3.14, and the Diameter 1; What will the Diameter of another Circle be, whoſe Circumference is 44?*

The Proportion is;

As 3.14, is to 1, ſo is 44 to the Diameter required.

*By Gunter with Compasses, thus;*

The Extent from 3.14, to 1, reacheth from 44 to the Diameter required.

*By sliding Gunter, thus;*

ing 3.14 (on the middle piece) right against on the out side piece); and then against 44 (on first) is 14 (on the second), which is the Dia- required.

*te*; In the Rule of Three Direct; If the 3*d* ber be greater than the 1*st*, then will the 4*th* ber be greater than the 2*d*: But, the 3*d* Number be less than the 1*st*, then the will be less than the 2*d*.

Example 3.

30 *Acres of Land be worth* 25 *Pound a Year*; *uch a Year will* 54 *Acres be worth?*

o do this, or any Question in the *Rule of Three*, ys in the Proportion, let the first and third bers or Terms be of one Kind or Denomina- : And in this it is,

s 30 Acres is to 25 Pound, so is 54 Acres to 45 ds.

*For by Gunter with Compasses;*

The Extent from 30 to 25, reacheth from 54 to the yearly Rent required.

*Also, by sliding Gunter.*

ing 30 against 25, then against 54 (on the first) (on the second) as before.

By

By this time the Reader is so well acquainted in the way of working a Proportion on the Line of Numbers, with Compasses, or without, that it's a needless thing to express it in words, being ever the same. Henceforward you shall have only the Proportion set down, leaving the manner of its Operation to your Practice, except in case where the Working differs from what went before.

## PROB. VIII.

*Of the Rule of Proportion Inverse, or three Numbers given; to find a fourth in an Inverse Proportion (or the backward Rule of 3) by the Line of Numbers.*

1. IN this Rule you must note; If the 3*d* Number be greater than the 1*st*, then will the 4*th* be less than the 2*d*: But,

2. If the 3*d* be less than the first, the 4*th* is to be greater than the 2*d*.

3. And to resolve Questions of the backward Rule of 3, the Proportion is thus;

As the third Number is to the second, so is the first to the fourth.

Example.

*If 72 Pioneers make a Trench in 48 Hours; in what long time can 54 Pioneers make it?*

By the Directions above, this is the Proportion:

As 54 Men is to 48 Hours, so is 72 Men to 64 Hours; the Answer to the Question: From which you may conclude, that 54 Men will perform as much in 64 hours, as 72 Men in 48 hours.

72 = 48 = 54

72

PRO

## PROB. IX.

*Duplicate Proportion, or 3 Numbers given; to find a 4th in a Duplicate Proportion, by the Line of Numbers.*

This Rule is chiefly uſed in Proportions of Lines to Superficies, *&c.* Wherein the firſt and ſecond Term are to be of one Kind or Denomination.

Example 1.

*If the Diameter of a Circle be* 1, *and its Area Content* 0.78539; *What's the Content of a Circle, whoſe Diameter is* 14?

To perform this, the firſt and ſecond Terms (by the Note above) are to be Lines; that is, the Diameters given; and then the Proportion is thus:

As 1 is to 14, ſo is 0.785 to a 4*th*; and ſo is that to the Content required.

*By Gunter with Compaſſes.*

The Extent from 1 to 14, reacheth from 0.785 to 11; and the ſame Extent laid (the ſame way) from 11, reacheth to 154, the Content required.

*By the ſliding Gunter.*

Bring 1 (on the middle piece) right againſt 14 (on the outſide piece); then againſt 0.785 (on the firſt) is 11 (on the ſecond); and againſt 11 (on the firſt) is 154 (on the ſecond), the Content required.

Example 2.

*If the Diameter of a Circle be* 7, *and its Area* 38,5; *What is the Area of a Circle, whoſe Diameter is* 12? Anſwer, 112.

For, as 7 is to 12, ſo is 38,5 to 66; and ſo is 66 to 112.

Example 3.

*If the Diameter of a Circle be* 1, *and its Ar* 0.78539; *What is the Diameter of a Circle, whoſ Area is* 154? Anſwer, 14.

In this the Proportion is of Superficies to Lin which is thus;

As Area 0.785 is to Area 154, ſo is ſquare of D ameter 1, to ſquare of Diameter required.

*By Gunter with Compaſſes.*

The Extent from 0.785 to 154, reacheth from to 196, the ſquare of the Diameter required.

Then divide the ſpace between 1 (always the mi dle 1, if the number of places be odd; but if eve the firſt 1) and 196, into two equal parts, the fi in the middle reſteth at 14, the Diameter of t Circle, whoſe Area is 154.

*By the ſliding Gunter.*

Bring 0.785 againſt 154, and againſt 1 (on t firſt) is 196 (on the ſecond); then find the midd between 1 and 196, which is at 14, the Diamet as before.

Example 4.

*The Diameter of a Circle being* 1, *and its A* 0.785; *What is the Diameter of a Circle, wh Area is* 112? Anſwer, 12.

For, as 0.785 is to 112, ſo is 1 to 144; the mi dle between it and 1, is at 12, the Diameter r quired.

PRO

## PROB. X.

*Of Triplicate Proportion, or 3 Numbers given; to find a 4th in a Triplicate Proportion, by the Line of Numbers.*

THis Problem concerneth the Proportion of Lines to Solids, and the contrary; in which, evermore make the firſt and ſecond Term to be of one Denomination.

### Example 1.

*If an Iron Bullet weigh 9 Pounds, and its Diameter 4 Inches; What is the Weight of another Iron Bullet, whoſe Diameter is 6 Inches?*

To perform this, the firſt and ſecond Terms are to be Lines; that is, the given Diameters, and then the Proportion is thus;

As 4 is to 6, ſo is 9 to 13.5; and ſo is 13.5 to 20.2, ſo is 20.2 to 30.3; that is, 30 Pounds 3 Tenths of a Pound; which is the Weight required.

That is, *By the Gunter with Compaſſes:*

The Extent from 4 to 6, being laid 3 times from 9, will reach to 30 Pounds 3 Tenths, the *Weight* required.

And, *By the ſliding Gunter thus*;

Set 4 againſt 6, and againſt 9 on the *Firſt* is 13.5 on the *Second*; then againſt 15.5 on the *Firſt* is 20.2 on the *Second*; and againſt 20.2 on the *Firſt* is 30.3 on the *Second*; that is, 30 *Pounds* 3 Tenths, as before.

### Example 2.

*If an Iron Bullet 1 Inch Diameter weigh Pound* 0.1406 *Parts; What is the Weight of another, whoſe*

*Diameter is* 4 *Inches, it being of the ſame Metal?* Anſwer, 9 *Pounds.* For,

As 1 is to 4, ſo is 0.1406 to 0.563; and ſo is 0.563 to 2.25; and ſo is, 2.25 to 9 Pounds, the Weight required.

Example 3.

*If a Gun* 6 *Inches Bore require* 11 *Pound of Powder, How much will ſerve a Gun* 4 *Inches Bore?* Anſwer, *Pounds* 3.25 *parts.* For,

As 6 to 4, ſo is 11 to 7.3; and ſo is 7.3 to 4.88; and ſo is 4.88 to 3.25; which is Pounds 3.25 parts of a Pound, or Pounds $3\frac{1}{4}$.

Example 4.

*If an Iron Bullet* 1 *Inch Diameter weigh Pound* 0.1406 *parts; What Diameter ſhall that be which weigheth* 9 *Pound of the ſame Metal?* Anſwer, 4 *Inches?* For,

As 0.1406 is to 9, ſo is 1 to 64, the Cube of the Diameter required; then divide the ſpace between 1 and 64 into 3 equal parts, and the foot in the firſt $\frac{1}{3}$ part (from 1) reacheth to 4, the Diameter of the Iron Shot weighing 9 Pounds.

II. *The*

## II. *The Uſe of the Line of Numbers (commonly called* Gunter's *Line) in meaſuring Superficies, as Board, Glaſs, Land,* &c. *and Solids, as Timber, Stone, Gauging,* &c.

### PROB. I.

*The Length and Breadth of any Square, or long Square Superficies given; to find the Area or Content thereof.*

*The Proportion is this;*

AS 1 to the Breadth, ſo is the Length to the Content.

Example 1.

*A plain Superficies, as a Board or Plank, be given to be meaſured; the Breadth thereof is* 15 *Inches, and the Length* 61 *Inches: What is the Content of it?* Anſwer, 915 *Inches.* For,

As 1 to 15, ſo is 61 to 915 Inches; the Content required.

*Note*; Such as the Breadth and Length is, ſuch is the Content; ſo that if the Breadth and Length be Feet, the Content is Feet; if Perches, then Perches, *&c.*

Example 2.

*A Piece of Wainſcot, in form of a long Square, whoſe Length is feet* 15.5 *Parts, and Breadth feet* 2.25 *Parts: What is the Content?* Anſwer, *Feet* 34.86 *Parts.* For,

As 1 is to 2.25, ſo is 15.5 to 34.86, the Content required.

## PROB. II.

*The Breadth and Length of a Superficies given in one kind of Meaſure; to find the Content thereof in another kind of Meaſure.*

*To do this, the Proportion is thus;*

AS the other kind of Meaſure is to the Breadth, ſo is the Length to the Content.

Example 1.

*A Plank or Board* 15 *Inches broad,* 61 *Inches long; I demand the Content of it in Feet?* Anſwer, *Feet* 6.35 *Parts.*

In a Foot ſuperficial, or a ſquare Foot, is 144 ſquare Inches, and therefore the Proportion is thus;

As 144 is to 15 Inches, ſo is 61 Inches to Feet 6.35 Parts of a Foot.

Example 2.

*A Piece of Land, in form a long Square, whoſe Breadth being* 30 *Perches, Length* 183 *Perches; What is the Content in Acres?* Anſwer, *Acres* 34.35 *Parts.*

For 160 Perches is in an Acre, and the Proportion is thus;

As 160 is to 30 Perches, ſo is 183 Perches to Acres 34.35 parts of an Acre.

Example 3.

*A Piece of Painting, in form a long Square, whoſe breadth, Feet* 3.5, *and Length* 21 *Feet; How many ſquare Yards is the Content?* Anſwer, *Yards* 8.16 *Parts.*

For 9 Feet being a Yard ſquare, the Proportion is thus;

As 9 is to 3.5 Feet, ſo is 21 Feet to Yards 8.16 Parts.

PROB.

## PROB. III.

*The Breadth of a Superficies given in one kind of Meaſure, and the Length in another; to find the Content in the greater Meaſure.*

*To do this, the Proportion is thus;*

AS the greater Meaſure is to the Breadth, ſo is the Length to the Content required.

Example 1.

*Admit a Board* 10 *Inches broad, and* 20 *Feet long; I demand the Content in Feet?* Anſwer, *Feet* 16.6 *tenths of a Foot.*

For the Proportion is thus;

As 12 is to 10 Inches, ſo is 20 Feet to Feet 16.6 tenths.

Example 2.

*If a Board or Plank be* 15 *Inches broad, and* 27 *Feet long; What is the Content of it in Feet?* Anſwer, *Feet* 33.75 *parts of a Foot, or* 33 ¾ *Feet.* For it is,

As 12 is to 15 Inches, ſo is 27 Feet to Feet 33.75 parts.

Example 3.

*A Board* 7½ *Inches broad, and* 29¼ *Feet long; What's the Content in Feet?* Anſwer, *Feet* 18.4 *tenths.* For it is,

As 12 is to 7.5, ſo is 29.25 to Feet 18.4 tenths.

Example 4.

*A Plot of Land (in form a long Square) whoſe Breadth is* 30 *Perches, and Length is Chains* 15.25 *Links, (meaſured by a Chain of* 4 *Perches in* 100 *Links); I demand the Content thereof in Acres?* Anſwer, *Acres* 11.4 *tenths.* For it is,

As 40 is to 30 Perches, ſo is Chains 15.25 to Acres 11.4 tenths of an Acre.

## PROB. IV.

*The Breadth of a Superficies given; to find how much in Length will make a Foot, a Yard, a Perch, or an Acre, &c.*

*To do this, take this general Rule:*

AS the Breadth is to a Foot, (a Yard, *&c.*) ſo is a Foot, (a Yard, *&c.*) to the Length, which will make a Foot, (a Yard, *&c.*)

Example 1.

*If a Board be 7½ Inches broad; How much in Length will make a Foot ſquare?* Anſwer, *Inches 19.2 tenths of an Inch.*

For the Proportion is thus;

As 7.5 is to 12, ſo is 12 to Inches 19.2 tenths.

Example 2.

*A Plank 30 Inches broad; How much in Length will make a Foot?* Anſwer, *Inches 4.8 tenths of an Inch.* For it is,

As 30 Inches is to 12, ſo is 12 to Inches 4.8 tenths.

Example 3.

*A Pain of Glaſs being in Breadth feet 2.5 tenths; How much in length will make a Foot?* Anſwer, *4 tenths of a Foot.* For it is thus,

As 2.5 is to 1 Foot, ſo is 1 Foot to 0.4 tenths of a Foot.

Example 4.

*A Piece of Matting being 27 Inches broad; How much in length will make a Yard ſquare?* Anſwer, *48 Inches or 4 Feet.* For it is thus,

As 27 Inches is to 36 Inches, ſo is 36 Inches to 48 Inches: But if the Breadth be given in Feet; that is for 27 Inches, it be $2\frac{1}{4}$ Feet, or 2.25 Feet: Then work thus;

As 2.25 is to 3 Feet, ſo is 3 Feet to 4 Feet in length to make a Yard ſquare.

## PROB. V.

*The Diameter of a Circle given; to find the Circumference.*

*The Analogy or Proportion is thus;*

AS 1 is to 3.142, ſo is the Diameter to its Circumference.

Example.

*If the Diameter of a Circle be* 15 *Inches; What is the Circumference of it?* Anſwer, *Inches* 47.12 parts. For,

As 1 is to 3.142, ſo is 15 Inches to Inches 47.12 parts.

## PROB. VI.

*The Circumference of a Circle given, to find its Diameter.*

*The Proportion ſtands thus;*

AS 3.142 is to 1, ſo is the Circumference to its Diameter.

Example.

*The Circumference of a Circle being* 44 *Feet; What is the Diameter thereof?* Anſwer, *Feet* 14. For it is,

As 3.142 is to 1, ſo is 44 Feet to Feet 14.

* PROB.

## PROB. VII.

*The Diameter of a Circle given; to find its ſuperficial Content.*

*The Analogy is thus;*

AS 1 is to the Diameter, ſo is 0.7854 to a Number, and ſo is that 4*th* to the Superficial Content required.

Example.

*The Diameter of a Circle being* 15 *Inches; What's the Content of it?* Anſwer, *Inches* 176.7 *tenths.*

For it is,

As 1 is to 15, ſo is 0.7854 to 11.78; and ſo 11.78 to 176.7 the ſuperficial Content required.

## PROB. VIII.

*The Circumference of a Circle being given, to find the ſuperficial Content of it.*

*The Proportion is this;*

AS 1 is to the Circumference, ſo is 0.07958 to a 4*th*; and ſo is that 4*th* to the Superficial Content required.

Example.

*If the Circumference of a Circle be* 44 *Inches, What's the Content?* Anſwer, *Inches* 154.06 *Parts of an Inch.* For it is,

As 1 is to 44, ſo is 0.07958 to 3.5; and ſo 3.5 to 154.06.

## *The Uſe of the Line of Numbers in ſolid Meaſure, ſuch as Timber, Stone, Gauging,* &c.

### PROB. I.

*Side of a ſquare Solid given in Inches, to find how much in Length will make a Foot ſolid.*

*The Proportion is thus;*

AS the given Side is to 12, ſo is 12 to a 4*th* Number; and ſo is that 4*th* Number to the Length required to make a Foot-ſolid.

Example 1.

*A ſquare Piece of Timber or Stone, whoſe Breadth and Depth, each* 8 *Inches; How much in Length will make a Foot-ſolid?* Anſwer, 27 *Inches, or* 2 *Feet* 3 *Inches.* For it is,

As 8 is to 12, ſo is 12 to 18; and ſo is 18 to 27 Inches.

Example 2.

*A ſquare Piece of Timber or Stone, whoſe ſide is* 2 *Feet or* 24 *Inches; How much in Length will make a Foot?* Anſwer, 3 *Inches.* For it is,

As 24 is to 12, ſo is 12 to 6; and ſo is 6 to 3 Inches.

### PROB. II.

*The Side of a ſquare Solid given in Foot-meaſure, (which is the Decimal Foot, or a Foot divided into* 100 *equal Parts); to find how much in Length will make a Foot-ſolid.*

*The Proportion is thus;*

AS the given Side is to 1, ſo is 1 to a 4*th* Number; and ſo is that 4*th* Number to the Length required to make a Foot-ſolid. Exam-

Example.

*A ſquare Piece of Timber, whoſe Side is Foot* 1. *Parts; How much in Length will make a Foot-ſoli*
Anſwer, 0.438 *Parts of a Foot.* For it is,

As 1.52 is to 1, ſo is 1 to 0.664; and ſo is 0.6 to 0.438 Parts of a Foot.

## PROB. III.

*The Breadth and Depth of a Solid, whoſe two Ends equal Long Squares, being given in Inches, or Foo meaſure; to find how much in Length will make a Foo ſolid.*

1. *The Proportion for Inches is thus;*

AS 12 is to the Breadth, ſo is the Depth to a 4 Number: Then,

As that 4th Number is to 12, ſo is 12 to t Length in Inches to make a Foot-ſolid.

2. *The Proportion for Foot-meaſure thus;*

As 1 is to the Breadth, ſo is the Depth to a 4 Number: Then,

As that 4*th* Number is to 1, ſo is 1 to the Leng in Foot-meaſure to make a Foot-ſolid.

Example 1.

*A Piece of Timber or Stone, whoſe Breadth i Inches, and Depth* 19 *Inches; How much in Leng will make a Foot?* Anſwer, *Inches* 8.26 *parts.* For it i

As 12 is to 11, ſo is 19 to 17.5: And then ſay,

As 17.5 is to 12, ſo is 12 to Inches 8.26 Parts i Length to make a Foot-ſolid.

Exampl

Example 2.

*A Piece of Timber, in Breadth Foot* 0.75 *Parts, and* [illegible] *Foot* 1.25 *Parts; How much in Length will* [illegible] *a Foot-solid?* Answer, *Foot* 1.06 *Parts.* For it

[illegible] 1 is to 0.75, so is 1.25 to 0.94: Then say,
[illegible] 0.94 is to 1, so is 1 to Foot 1.06 Parts in length
make a Foot.

## PROB. IV.

*Side of a square Solid, and its Length being given; to find the Content.*

When the Side is given in Inches, and Length in Feet, the Proportion is thus;

As 12 is to the given Side, so is the Length to a Number; and so is that 4*th* Number to the Content in Feet.

2. When the Side and Length are both given in one measure, the Proportion is thus;

As 1 is to the given Side, so is the Length to a Number; and so is that 4*th* Number to the Content required.

Example 1.

*A square Piece of Timber, whose Side is* 9 *Inches, and Length* 35 *Feet; How many Feet of Timber is in it?* Answer, *Feet* 19.85 *Parts.* For it is,

As 12 is to 9, so is 35 to 26.4; and so is 26.4 to 19.85 Parts.

Example 2.

*A Piece of Timber* 16 *Inches square, and* 28 *Feet long; How much is the Content?* Answer, 50 *Feet.* For it is,

As

As 12 to 16, ſo is 28 to 37.4; and ſo is 37.4 to 50 Feet.

Example 3.

*A Stone, feet 2.75 parts ſquare, and feet 7.50 parts long; How much is the Content?* Anſwer, *feet 56.52 parts.* For it is,

As 1 to 2.75, ſo is 7.50 to 20.6; and ſo is 20.6 to feet 56.52 parts.

## PROB. V.

*The Length, Breadth, and Depth of a ſquare Solid being given, to find the Solid Content.*

1. IF the Breadth and Depth be given in Inches, and the Length in Feet, the Propoſition is thus;

As 12 is to the Breadth, ſo is the Depth to a Number: Then ſay,

As 12 is to that 4*th* Number, ſo is the length in feet to the Content in feet.

2. When the Length, Breadth, and Depth are given in Foot-meaſure, then the Proportion is thus:

As 1 is to the Breadth, ſo is the Depth to a Number: And then again ſay,

As 1 is to that 4*th* Number, ſo is the Length to the Content in feet.

Example 1.

*If a ſquare Piece of Timber be in Breadth 19 Inches, Depth 11 Inches, and 20 Feet long; How much is the Solid Content?* Anſwer, *Feet 29.03 parts.* For thus;

As 12 to 19, ſo is 11 to 17.4: Then ſay,

As 12 to 17.4, ſo is 20 to feet 29.03 parts, the Content required.

Exa

Example 2.

*A Stone* 20 *Inches broad,* 13 *Inches deep, and Feet* 15 *or* $15\frac{1}{4}$ *Feet; How much is the Content? Answer, Feet* 27.5 *or* $27\frac{1}{2}$ *feet.* For it is,
As 12 to 20, ſo is 13 to 21.67: And then,
As 12 to 21.67, ſo is 15.25 to 27.5; that is $27\frac{1}{2}$ feet.

Example 3.

*A ſquar'd Piece of Timber, foot* 1.25 *broad, foot* 0.56 *deep, and* 36 *feet long; How much is the Content? Answer, feet* 25.20 *parts, or* $25\frac{2}{10}$ *feet.* For it is,
As 1 is to 1.25, ſo is 0.56 to 0.70: And then,
As 1 is to 0.70, ſo is 36 to feet 25.2 tenths.

## PROB. VI.

*The Diameter of a Cylinder given, to find how much in length will make a Foot-ſolid.*

1. IF the Diameter be given in Inches, the Proportion is thus;
As the given Diameter is to 13.531, ſo is 12 to a Number; and ſo is that 4*th* Number to the length required to make a Foot-ſolid.

2. When the Diameter is given in Foot-meaſure, the Proportion is thus;
As the given Diameter is to 1.128, ſo is 1 to a 4*th* Number; and ſo is that 4*th* Number to the length, which will make a Foot-ſolid.

Example.

*A round Piece of Timber, or Stone, being* 15 *Inches in Diameter; How much in Length will make a Foot-ſolid? Answer, Inches* 9.78 *parts of an Inch.* For it is,
As 15 is to 13.531, ſo is 12 to 10.75; and ſo is 10.75 to Inches 9.78 Parts.

But

But ſuppoſing the Diameter of the ſame to be ken in Foot-meaſure, then it's Foot 1.25 parts; N how much will make a Foot? Anſwer, Foot 0 parts of a foot. For it is thus;

As 1.25 is to 1.128, ſo is 1 to 0.905; and ſ 0.905 to foot 0.815 parts.

## PROB. VII.

*The Circumference of a Cylinder given; to find much in Length will make a Foot-ſolid.*

1. WHen the Circumference is given in Inc the Proportion is;

As the Circumference is to 42.54, ſo is 12 to a Number; and ſo is that 4*th* Number to the Len required to make a Foot-ſolid.

2. But if the Circumference be given in Fo meaſure, then the Proportion is;

As the Circumference is to 3.545, ſo is 1 to a Number; and ſo is that 4*th* Number to the Len to make a Foot-ſolid.

Example.

*If a round Stone, or Tree, be* 44 *Inches about; much in Length will make a Foot?* Anſwer, I 11.22 *parts.* For it is,

As 44 to 42.54, ſo is 12 to 11.52; and ſo is 1 to Inches 11.22 parts of an inch.

But ſuppoſe the ſame was meaſured by Foot-m ſure, and the Circumference found to be feet; parts; How much in length will make a foo Anſwer, Foot 0.935 parts. For it is thus,

As 3.67 is to 3.545, ſo is 1 to 0.967; and 0.967 to foot 0.935 parts.

PRO

## PROB. VIII.

*Diameter and Length of a Cylinder given; to find its ſolid Content.*

WHen the Diameter is given in Inches, and Length in Feet, the Proportion is thus;

As 13.531 is to the Diameter, ſo is the Length to 4*th* Number; and ſo is that 4*th* Number to the ſolid Content in feet.

2. If the Diameter and Length are both given in foot-meaſure, then the Proportion is thus;

As 1.128 is to the Diameter, ſo is the Length to 4*th* Number; and ſo is that 4*th* Number to the Content required.

Example.

*A round Piece of Timber* 10 *Inches through, and* 30 *Feet long; How many Feet of Timber is in it?* Anſwer, *Feet* 16.35 *parts.* For it is,

As 13.531 to 10, ſo is 30 to 22.18; and ſo is 22.18 to feet 16.35 parts of a foot.

But ſuppoſe the ſame Piece meaſured by Foot-meaſure, then it's foot 0.83 parts through: And the Work is thus;

As 1.128 to 0.83, ſo is 30 to 22.18; and ſo is 22.18 to feet 16.35 parts, as before.

## PROB. IX.

*The Circumference and Length of a Cylinder given; to find the Solid Content.*

IF the Circumference be given in Inches, and Length in Feet, the Proportion is thus;

As 42.54 is to the Circumference, ſo is the Length to a 4*th* Number; and ſo is this 4*th* Number to the ſolid Content in feet.

2. When the Circumference and Length are both in Foot-meaſure, the firſt Term being 3.545, (inſtead of 42.54) the former words will ſerve here.

Example.

*A round Stone, or Tree, being* 30 *Inches about, and* 25 *feet long; How many feet ſolid are in it? Anſwer, Feet* 12.5 *parts.* For it is thus;

As 42.54 is to 30, ſo is 25 to 17.62; and ſo is 17.62 to feet 12.53 parts.

Now, the Compaſs about being taken in foot-meaſure, it's feet 2.50 parts; and the Proportion is,

As 3.545 to 2.50, ſo is 25 to 17.62; and ſo is 17.62 to feet 12.53 parts, as before.

*Note* 1. When Timber tapers, that is, is bigger at one end than t'other, it's uſual to take the Breadth and Depth in the middle of its Length; and by them to meaſure the Piece as if it were both ends of a bigneſs.

*Note* 2. The Proportions for Foot-meaſure, are the ſame when all the Dimenſions are taken in Inches; only the ſolid Content is found in Inches.

*Note* 3. The ſolid Content in Inches, divided by 1728, the Quotient is feet; but if divided by 282, or 231, the firſt is Beer, and the latter is Wine Gallons: And how to divide by the Line of Numbers was ſhewed in *Prob.* 4. of the firſt Uſes of the Gunter.

PROB

## PROB. X.

*The Diameter of a Cask at Head and Bung, and alſo its Length given in Inches; to find its Content in Gallons, Beer or Wine.*

*The Rule is thus;*

AS 1 is to 0.7, ſo is the Difference of Bung and Head Diameters to a 4*th* Number; which being added to the Head Diameter, the Sum is a Mean Diameter, reducing the Cask to a Cylinder. Then ſay,

2. As the Gauge Point (which for Beer or Ale is 18.95, but for Wine 17.15) is to the Mean Diameter, ſo is the Length to a 4*th* Number; and ſo is this 4*th* Number to the Content in Gallons required.

Example.

*Suppoſe a Cask whoſe Length is* ——— 40 } *Inches:*

*Diameter at* ——— { *Bung* 28 / *Head* 20 }

*What's the Content of this Cask in Gallons, Beer or Wine?*

Anſwer, 73 *Gallons Beer, and Wine Gallons* 89.2 *tenths.*

See the Work following:

*Bung Diameter* —— —— 28 Inches.
*Head Diameter* —— —— 20

*Their Difference is* ——— 8 Inches.

Then, As 1 to 0.7, ſo is 8 to 5.6; which added to 20, the *Head Diameter*, makes 25.6 for the *Mean Diameter:* Then ſay,

As { 18.95 / 17.15 } is to 25.6, ſo is 40 to { 54. / 59.76 }; and ſo is

{ 54. / 59.76 } to { 73. *Beer* / 89.2 *Wine* } *Gallons.*

*By Gunter with Compaſſes.*

1. The Extent from 1 to 0.7, will reach the ſame way from 8 to 5.6; which being added to 20 (the *Head Diameter*) makes 25.6 for the *Mean Diameter*. Then,

2. The Extent from 18.95 (the *Gauge Point for Beer*) to 25.6, will reach from 40 to 54, and the Extent turned over again, reacheth to 73, the Content in *Beer Gallons*.

In like manner, the Extent from 17.15, (the *Gauge Point for Wine*) to 25.6, being laid twice from 40, will reach to 89.2, the *Wine Gallons*.

*By the ſliding Gunter.*

1. Set 1 againſt 0.7, and againſt 8 on the firſt, is 5.6 on the ſecond; which added to 20, (the *Head Diameter*) makes 25.6 for the *Mean Diameter*. Then

2. Set 18.95 (the *Gauge Point for Beer*) on the firſt, againſt 25.6 on the ſecond; then againſt 40 on the firſt, is 54 on the ſecond, and againſt 54 on the firſt is 73 on the ſecond, the Content in *Beer Gallons*.

Alſo, if you ſet the *Gauge Point for Wine* 17.15 againſt the *Mean Diameter* 25.6; then againſt the *Length of the Cask* 40 on the firſt, on the ſecond you will find 59.76; and againſt 59.76 on the firſt, you find on the ſecond 89.2, the Content in *Wine Gallons*.

PRO

## PROB. XI.

*The Length of a Ship's Keel, and Breadth at the Beam given; to find her Tunnage.*

IT's the Practice of the Shipwrights about *London*, to multiply the Length of the Keel, Breadth, and half-breadth into one another, and to divide the laſt product by 94, whoſe Quotient they count for the Ship's Tunnage: from whence I frame this Proportion following, to be wrought by the Line of Numbers.

1. As 188 is to the Breadth, ſo is the Breadth to a 4th Number: Then ſay,

2. As 1 is to that 4th Number, ſo is the Length to the Tunnage required.

Example.

*Suppoſe a Ship 72 feet by the Keel, and 24 feet by the Beam; I demand her Tunnage?* Anſwer, *Tuns 220.6 tenths neareſt.* See the Work:

As 188 to 24, ſo is 24 to 3.06: And then,
As 1 is to 3.06, ſo is 72 to Tuns 220.6 tenths.

That is, *By the Gunter with Compaſſes.*

1. The Extent from the *Given Number* 188 to the *Breadth of the Beam* 24, will reach from (the ſaid *Breadth*) 24 to 3.06. Then,

2. The Extent from 1 to 3.06, will reach from the *Length of the Keel* 72, to Tuns 220.6 Tenths, the Tunnage required.

*Or more briefly thus;*

The Extent from 13.71, (which is the *Square Root* of the *Given Number* 188) to the *Breadth of the Beam* 24, being turned over twice from the *Length of*

*the Keel* 72, reacheth to Tuns 220.6 Tenths as before.

*By the ſliding Gunter.*

1. Set the *Given Number* 188 againſt the *Breadth of the Ship* 24, and againſt the ſaid Breadth 24 on the firſt, is 3.06 on the ſecond. Then,

2. Set 1 againſt 3.06, and againſt the Length of the Keel 72 on the firſt, is Tuns 220.6 Tenths on the ſecond as before.

## PROB. XII.

*To find the Tunnage of a Box, Bale, or Caſe, having its Length, Breadth, and Depth given.*

*The Rule is thus*;

1. AS 66 is to the Breadth, ſo is the Depth to a 4*th* Number: Then,

2. As 1 is to this 4*th* Number, ſo is the Length to its Tunnage required.

Example.

*A Caſe, or Bale, being* 6 *feet broad,* 4 *feet deep, and* 10 *feet long; I demand its Tunnage?* Anſwer, 3.63 *parts.* For it is,

As 66 is to 6, ſo is 4 to 0.363: And then,

As 1 is to 0.363, ſo is 10 to Tuns 3.63 parts.

*By Gunter Scale with Compaſſes.*

1. The Extent from the *Given Number* 66 to the Breadth 6, reacheth from the Depth 4 to 0.363. Then,

2. The Extent from 1 to the laſt *found Number* 0.363, being laid from the Length 10, reacheth to 3.63; that is, 3 Tun and 63 parts of 100, or $3\frac{63}{100}$.

By

*By the ſliding Gunter, thus;*

1. Set the *Given Number* 66 againſt the *Breadth* of the *Bale* or *Caſe* 6, then againſt the *Depth* of it 4 on the firſt, you will find 0.363 on the ſecond, a *4th Proportional Number.* Then,

2. Set 1 againſt the ſaid *Proportional Number* 0.363, then againſt the *Length* of the *Bale* or *Caſe* 10 on the firſt, you will find on the ſecond 3.63 or $3\frac{63}{100}$, the Tunnage of the *Bale* or *Caſe* propoſed.

## PROB. XIII.

*The Diameter of a Globe given; to find its ſolid Content.*

*The Rule.*

AS 1 is to the Diameter, ſo is 0.5236 to a *4th* Number; and ſo is that *4th* to a *5th*; and ſo this *5th* to a ſolid Content required.

Example.

*A Globe whoſe Diameter is* 8 *Inches: What's the ſolid Content?* Anſwer, *Inches* 268. For it is wrought thus,

As 1 to 8, ſo is 0.5236 to 4.19; and ſo is 4.19 to 33.5; and ſo is 33.5 to 268 Inches.

## IV. *The Uſe of the Line of Numbers in Gunnery*

### PROB. I.

*The Diameter and Weight of any Piece of Ordnance known; to find the Weight of any other, being of the ſame Metal and Shape, its Diameter being known.*

Like Solids are in Proportion, as the Cubes of their agreeing Sides; therefore,

*The Rule is thus;*

AS the Diameter of the known Gun is to the Diameter of the Gun whoſe Weight is required; ſo is the Weight of the known Gun to a 4*th* Number; and ſo is that 4*th* to a 5*th*, and ſo is that 5*th* to the Weight required.

Example.

*Suppoſe a Braſs Saker, whoſe Diameter is Inches* 11.5 *tenths, do weigh* 1900 *Pounds; What will a Braſs Gun weigh, whoſe Diameter is Inches* 8.75 *parts?* Anſwer, 840 *Pounds.* For it is,

As 11.5 is to 8.75, ſo is 1900 to 1440; and ſo is 1440 to 1110; and ſo is 1110 to 840 Pounds.

That is, *By Gunter's Scale with Compaſſes.*

The Extent from the Diameter 11.5 to the Diameter 8.75, being laid three times from the Weight 1900, will reach to 840 Pounds, the Weight of the Gun required. And,

*By the ſliding Gunter, thus;*

Set the Diameter 11.5 againſt the Diameter 8.75; then againſt the Weight 1900 on the firſt, is 1440 on the ſecond; and againſt 1440 on the firſt, is 1110 on the ſecond: Alſo againſt 1110 on the firſt, is 840 Pounds, the Weight required.

PROB.

## PROB. II.

*ing the Diameter and Weight of one Piece of Ord-nce, and the Diameter of another Piece of another tal; to find the Weight of the laſt, it being of the ame Shape with the former.*

*The Rule is thus;*

FInd the Weight of the Piece as if it had been of the ſame Metal the propounded Piece is, by laſt *Prob.* Then,

2. Conſider the Proportions of Metals; which theſe, according to the beſt Authors:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Braſs* | | *Iron* | | 9 | | 8. |
| *Lead* | is to | *Iron* | As | 3 | is to | 2. |
| *Lead* | | *Stone* | | 4 | | 1. |
| *Iron* | | *Stone* | | 8 | | 3. |

3. Having the Weights of both Pieces in one ſort Metal, you muſt then proportion their Weights rding to their different Metals, by the propor-al Numbers of thoſe Metals; and then it's done.

### Example.

*If a Braſs Saker of Inches* 11.5 *tenths, weighs* 1900; *will an Iron Gun (of the ſame Shape) weigh, whoſe meter is Inches* 8.75 *parts?* Anſwer, 746 *Pounds.*

it is wrought thus:

1. I find by *Prob.* 1. that a Braſs Piece, of Inches 75, will weigh 840 Pounds; but becauſe this e is Iron, and the Proportion of Braſs to Iron (as ve ſaid) is as 9 to 8: therefore ſay,

2. As 9 is to 8, ſo is 840 to 746 Pounds.

PROB.

## PROB. III.

*By knowing the Allowance of Powder for one Gun; to ſ how much of the ſame Powder is requiſite for anot Gun.*

### *The Rule.*

AS the Diameter of the Bore of the Gun wh Allowance is known, is to the Diameter wh Allowance is required; ſo is the Allowance given a 4*th* Number; and ſo is that 4*th* to a 5*th*; and is this 5*th* to the Allowance required.

But note; Here it's underſtood, that both Gu are alike fortified; that is, they ſhould have t ſame Proportion in Weight, and Thickneſs of Met

### Example.

*If a Saker of Inches* 3.5 *tenths Bore, require* 4 *Pou of Powder; What will a Demi-Cannon of Inches* 6. *tenths Bore require?* Anſwer, *Pounds* 25.58 *par* For it is,

As 3.5 is to 6.5, ſo is 4 to 7.44; and ſo is 7.4 to 13.82; and ſo is 13.82 to Pounds 25.58 part the Weight of Powder for the Demi-Cannon in pro portion to the given Saker. But ſuppoſe the Weigh of the Saker is 1600, and the Weight of the Demi Cannon 6000; What Allowance of Powder muſt i then have?

1. By *Prob.* 1. find the Weight of the Demi Cannon in proportion to the Saker's Weight; which is thus:

As 3.5 to 6.5, ſo is 1600 to 2960; and ſo 2960 to 5500; and ſo is 5500 to 10020 Pound the Weight of the Demi-Cannon requiring Pound

25,58

8 parts of Powder for its Loading. But ſeeing
eight is ſuppoſed to be 6000; ſay,
As 10020 is to 6000, ſo is 25.58 to Pounds
the due Allowance of Powder for the Demi-
on of Inches 6.5 tenths Bore, and weighing
Pounds; at the rate a Saker Inches 3.5 tenths
, weighing 1600 Pounds, doth require 4 pounds
owder.

## PROB. IV.

*ing the Diameter and Weight of one Bullet, and the ameter of another of the ſame Metal given; to d the Weight of the latter.*

### *The Rule.*

He Weights of Bullets (of the ſame Metal) are
in Triplicate Proportion of their Diameters,
wrought by Directions in *Prob.* 10. of the firſt
of the Gunter.

### Example.

*f an Iron Bullet 4 Inches Diameter weigh 9 pounds; will an Iron Bullet of 6 Inches Diameter weigh?*
wer, *Pounds* 3.03 *tenths.* For it is thus;
4 to 6, ſo is 9 to 13.5; and ſo is 13.5 to 20.2;
ſo is 20.2 to pounds 30.3 tenths.

## PROB. V.

*Bullets equal in Diameter, but of differing Metal; the Diameter and Weight of one, to find the Weight the other.*

### *The Rule.*

S the Proportion of one Metal is to the other,
ſo is the Weight of the given Bullet to the
ght of the Bullet required.

Example

Example.

*Suppoſe an Iron Bullet 6 Inches Diameter, w pounds 30.3 tenths; What will a Stone Bullet of ſame Diameter weigh?* Anſwer, *Pounds* 11.36 p For it is wrought thus;

By *Prob.* 2. of Gunnery, the Proportion of I and Stone is as 8 to 3: therefore ſay,

As 8 is to 3, ſo is 30.3 to pounds 11.36 parts.

## PROB. VI.

*Having the Diameter and Weight of a Bullet of one of Metal, and the Diameter of another Bullet of ther Metal, given; to find the Weight of the latter.*

*The Rule.*

1. Find the Weight of it (by *Prob.* 4.) as i were of the ſame Metal.

2. Then find its Weight according to the P portion of the Metals by the laſt Problem, and done.

Example.

*If an Iron Bullet 4 Inches Diameter weigh 9 poun What is the Weight of a Leaden Bullet 6 Inches D meter?* Anſwer, *Pounds* 45.45 *parts.* For it is t wrought;

1. As 4 to 6, ſo is 9 to 13.5; and ſo is 13.5 20.2; and ſo is 20.2 to pounds 30.3 tenths, if it h been Iron: but being it's Lead, ſay,

2. As 2 is to 3, ſo is 30.3 to pounds 45.45 par the Weight being Lead.

V. T

## The Uſe of Gunter's Scale in Navigation; and firſt in Plain Sailing.

### CASE I.

*Rh and Diſtance ſail'd given; to find the Difference of Latitude and Departure from the Meridian.*

*To do this, the Proportions are theſe;*

AS Radius is to the Diſtance ſail'd, ſo is the Sine of the Courſe to the Departure from Meridian.

As Radius is to the Diſtance ſail'd, ſo is the Complement of the Courſe to the Difference of Latitude.

*Note*; The Radius, according to the Nature of the Proportion, may be any of theſe;

| | | |
|---|---|---|
| 8 Points | on the Line of | Sine Rumbs. |
| 4 Points | | Tangent Rumbs. |
| 90 Degrees | | Sines. |
| 45 Degrees | | Tangents. |

And for conveniency that each Proportion may be found in one Line,

| | | |
|---|---|---|
| S. | stand for | Sine. |
| S.c. | | Sine Complement. |
| T. | | Tangent. |
| T.c. | | Tangent Complement. |
| Cr. | | Courſe. |
| Diſt. | | Diſtance ſail'd. |
| Diff.Lat. | | Difference of Latitude. |
| Dep. | | Departure from the Merid. |

Exam-

Example.

*If a Ship ſails S. W. by S.* 104 *Minutes from Lati* 1 d. 45 m. *North; I demand what Latitude ſhe i and her Departure from the Meridian?*

As S. 8 Points to 104 M. ſo is S. $\left\{\begin{matrix}3\\5\end{matrix}\right\}$ Points to $\left\{\begin{matrix}\text{Dep.}\\\text{Diff. Lat.}\end{matrix}\right.$ 58 86

*By Gunter with Compaſſes.*

The Extent from 8 Points (on the Line of S *Rumbs*) to 104 M. (on the Line of *Numbers*) w reach (the ſame way) from 3 Points (on the L of *Sine Rumbs*) to 58 M. (on the Line of Numbe which is the Departure from the Meridian. And Compaſſes kept at the ſame Diſtance, will re (the ſame way) from 5 Points (on the Line of *Rumbs*) to 86 M. (on the Line of Numbers) w is the Difference of Latitude.

*Note*; The Courſe is 3 Points, becauſe S. W. b is 3 Points from the Meridian or South; and 5 Po is the Complement of the Courſe, becauſe S. W. b is 5 Points from the Parallel or Weſt: Underſt the like in any other Courſe.

*By ſliding Gunter.*

Bring 8 Points (on the lower outſide piece) gainſt 104 M. (in the Line of Numbers on the m dle piece); then againſt 3 Points (on the firſt) 58 M. (on the ſecond) the Departure from the M ridian: and againſt 5 Points (on the firſt) is 86 (on the ſecond) the Difference of Latitude.

| | d. | m. | |
|---|---|---|---|
| *Latitude departed from* —— | 1 | 45 | North. |
| *Difference of Latitude* 86 *M. or* —— | 1 | 26 | South. |
| *Subtract, gives Latitude required* —— | 0 | 19 | North. |

CA

## CASE II.

*ſe and Difference of Latitude given; to find the ſtance ſail'd, and Departure from the Meridian.*

*To do this, the Proportions are theſe;*

c. Cr. is to Diff. Lat. ſo is {Radius / S. Cr.} to the {Diſt. / Dep.}

### Example.

*ppoſe a Ship ſails N. N. E. from the Latitude of 15 m. South, and then, by Obſervation, is in Latitude 22 m. North; What is her Diſtance ſail'd, and rture from the Meridian?*

| | d. | m. | |
|---|---|---|---|
| *ude departed from* | 2 | 15 | South. |
| *ude by Obſervation* | 1 | 22 | North. |
| *d, gives the Difference of Latit.* | 3 | 37 | |

he Difference of Latitude 3 d. 37 m. reduced into tes by multiplying by 60, is 217 Minutes: Then,

6 Points is to 217 M. ſo is S. {8 / 2} Points to {234 the Diſt. / 90 the Dep.}

## CASE III.

*ſe and Departure from the Meridian given; to find the Diſtance and Difference of Latitude.*

*This is performed by theſe Proportions;*

S. Cr. is to the Dep. ſo is {Radius / S.c.Cr.} to the {Diſtance. / Diff. Lat.}

### Example.

*a Ship ſails S. E. by E. from 1 d. 10 m. North ude, till her Departure be 92 Minutes; What is Diſtance ſail'd, and Latitude ſhe is in?*

3 Points is to 92 m. ſo is S. {8 / 3} Points to {110 the Diſt. / 61 the Diff. Lat.}

CASE

## CASE IV.

*Diſtance and Difference of Latitude given; to find Courſe and Departure from the Meridian.*

*The Proportions are theſe;*

1. AS the Diſtance ſail'd is to Radius, ſo is Difference of Latitude to the Sine Comp ment of the Courſe.

2. As the Radius is to the Diſtance ſail'd, ſ the Sine of the Courſe to the Departure from Meridian.

Example.

*Admit a Ship ſails South Weſtward* 98 *Leagues ſ the* Lizard, *in Latitude* 50 d. 10 m. *North; then, by Obſervation, is in* 46 d. 40 m. *North L tude: What is her Courſe and Departure from the ridian?*

| | d. | m. | |
|---|---|---|---|
| *Latitude departed from* —— | 50 | 10 | North. |
| *Latitude by Obſervation* —— | 46 | 40 | North. |
| *The Difference of Latitude* —— | 3 | 30 | or 70 Leag |

1. As 98 Leag. is to S. 90 d. ſo is 70 Leag. t d. 30 m. whoſe Complement 44 d. 30 m. i Courſe from the South Weſtward; that is, S. neareſt: Then,

2. As S. 90 d. is to 98 Leag. ſo is S. 44 d. 3 to 68 Leagues, the Departure from the Meridian

*By Gunter with Compaſſes.*

1. The Extent from 98 Leag. (in the Li Numbers) to 90 degrees (in the Line of Sines) reach the ſame way from 70 Leag. (in the Li

N

mbers) to 45 deg. 30 min. (in the Line of Sines) ich being ſubtracted from 90 deg. leaves 44 deg. min. for the Courſe.

2. The Extent from 90 deg. (in the Line of Sines) 98 leag. (in the Line of Numbers) will reach 44 deg. 30 min. (in the Line of Sines) to 68 . (in the Line of Numbers) which is the De- ture from the Meridian.

*By ſliding Gunter.*

1. Bring 98 leag. (in the Line of Numbers, and the middle piece) againſt 90 deg. (in the Line of s, on the outſide piece); then right againſt 70 on the firſt, is 45 deg. 30 min. on the ſecond, ch is the Complement of the Courſe.

2. And as it now ſtands againſt 44 deg. 30 min. the Line of Sines, on the outſide piece) is 68 (in the Line of Numbers, on the middle piece), ch is the Departure as before.

## CASE V.

*ance and Departure given; to find the Courſe and Difference of Latitude.*

*The Operations are as follow;*

AS the Diſtance ſail'd is to Radius, ſo is the Departure to the Sine of the Courſe.

2. As Radius is to the Diſtance ſail'd, ſo is the Complement of the Courſe to the Difference of tude.

Example.

*A Ship runneth* 354 *Minutes North Eaſtward from* 1 *d.* 19 *m. South Latitude, until her Departure be* 150 *Minutes; What is her Courſe and Latitude ſhe is in?*

1. As 354 min. is to S. 90 deg. ſo is 150 min. to Sine 25 deg. the Courſe North Eaſtward, or N. N. E. $\frac{1}{4}$ E.

2. As S. 90 deg. is to 354 min. ſo is S. 65 deg. to 323 min. the Difference of Latitude.

| | d. | m. | |
|---|---|---|---|
| *Latitude departed from, is* —— | 1 | 19 | South. |
| *The Difference of Latit.* 323 *min. or* — | 5 | 23 | |
| *Subtract, gives Latitude the Ship is in* | 4 | 04 | North. |

## CASE VI.

*Difference of Latitude and Departure given; to find the Courſe and Diſtance.*

*To do this, theſe are the Proportions;*

1. AS the Difference of Latitude is to the Departure from the Meridian, ſo is Radius to the Tangent of the Courſe.

2. As the Sine of the Courſe is to the Departure from the Meridian, ſo is Radius to the Diſtance ſail'd.

Example.

*Sailing between the North and the Weſt, from* 1 *d.* 59 *m. South Latitude, and then arriveth at another Port which is in* 3 *d.* 8 *m. North Latitude, and is* 209 *Minutes to the Weſtward of the firſt Port; I demand the Courſe and Diſtance from the firſt Port to the ſecond?* Latitude

| | d. | m. | |
|---|---|---|---|
| *...de of the firſt Port* | 1 | 59 | South. |
| *...de of the ſecond Port* | 3 | 8 | North. |
| *...d, gives Diff. Latitude* | 5 | 7 or 307 min. | |

As 307 min. is to 209 min. ſo is Tang. 45 deg. ...ng. 34 deg. 15 min. the Courſe North Weſt- ..., or N. W. by N. neareſt.

As S. 34 d. 15 m. is to 209 m. ſo is S. 90 d. to ...m. the Diſtance between the Ports.

*By Gunter with Compaſſes.*

The Extent from 307 min. to 209 min. (in the ... of Numbers) will reach from 45 deg. (in the ... of Tangents, that now being the Radius) to ...g. 15 min. (in the ſame Line of Tangents) ...h is the Courſe from the Meridian.

...y. If the {Diff. Lat. / Depart.} be greateſt, the Cr. is {leſs / more} than ...g. from the Meridian.

The ſecond Canon for the Diſtance is wrought *Caſe* the 3*d*.

*By ſliding Gunter.*

In this Caſe, ſo put in the middle piece, that a ...gent Line made ſlide by and next a Tangent ..., alſo Numbers againſt Numbers: Then bring ... min. (in the Line of Numbers on the middle ...) againſt 209 min. (in the Line of Numbers ...e outſide piece); then againſt 45 deg. (in the ... of Tangents on the middle piece) is 34 deg. ... min. (in the Tangents on the outſide piece) ...h is the Courſe required.

2. For the Diſtance, the manner of working is the ſame as hath been ſhewed in Caſe 1*ſt*, 2*d*, or 3*d*.

## *To reſolve a Traverſe by Gunter.*

### Example 1.

*A Ship in Latitude* 40 *d. North, and Longitude* 5 *d.* 24 *m. Weſt; ſhe ſails firſt S. E. by S.* 68 *Minutes, then S. W. by W.* 55 *Minutes, and then W. N. W.* 75 *Minutes; I demand the Courſe and Diſtance from the firſt Place of Departure, and what Latitude and Longitude ſhe is now in?*

To do this, firſt find the Difference of Latitude and Departure from the Meridian for each ſeveral Courſe, as directed in *Caſe* 1. of Plain Sailing.

2. Collect the ſeveral Differences of Latitude, whether North or South, into one Sum; and in like manner, the ſeveral Departures, either Eaſt or Weſt; taking the Difference of the Northing and Southing for the Difference of Latitude; and the Difference of the Eaſting and Weſting for the Departure from the Meridian.

3. Having now the Difference of Latitude, and the Departure known, the Courſe and Diſtance may be found by the 6th *Caſe* of Plain Sailing.

4. The Difference of Longitude may be found by this Proportion;

As the Sine Complement of the middle Latitude is to the Departure from the Meridian, ſo is Radius to the Difference of Longitude. See the Work following.

1. Courſe

| | | Pts. | M. | |
|---|---|---|---|---|
| Courſe. | As S. 8 Points to 68 m. ſo S. | 3 | to 38 | Eaſting. |
| | | 5 | to 57 | Southing. |
| Courſe. | As S. 8 Points to 55 m. ſo S. | 5 | to 46 | Weſting. |
| | | 3 | to 30.6 | Southing. |
| Courſe. | As S. 8 Points to 75 m. ſo S. | 6 | to 69.5 | Weſting. |
| | | 2 | to 28.8 | Northing. |

| Courſes. | Dift. | Diff. Lat. North | Diff. Lat. South | Departure. Eaſt | Departure. Weſt | |
|---|---|---|---|---|---|---|
| S. E. by S. | 68 | | 57. | 38. | | |
| S.W.by W. | 55 | | 30.6 | | 46. | |
| W. N.W. | 75 | 28.8 | | | 69.5 | |
| | | | 87.6 | | 115.5 | |
| | | | 28.8 | | 38. | |
| | Diff. Lat. | | 58.8 | | 77.5 | Dep. Then, |

m. m. d. d. m.

As 58.8 is to 77.5, ſo is T. 45 to T. 52.50.
Courſe from the South towards the Weſt; that
S.W. ¾ W. almoſt. And again,

As S. 52 d. 50 m. is to 77.5, ſo is S. 90 d. to
m. the Diſtance from the firſt Place of Departure.

| | d. | m. | |
|---|---|---|---|
| *itude departed from* —— | 40 | 0 | North. |
| *Difference of Latitude* 58.8 *or* — | 0 | 59 | Southerly. |
| *raft, gives Lat. the Ship is in* — | 39 | 1 | North. |
| *efore the middle Latitude is* — | 39 | 30 | |
| *racted from* —— | 90 | 0 | |
| *his Comp. of middle Latitude* — | 50 | 30 | |

As S. 50 d. 30 m. is to 77.5, ſo is S. 90 d. to
m. the Difference of Longitude.

| | d. | m. | |
|---|---|---|---|
| *The Longitude departed from is* ——— | 5 | 24 | Weſt. |
| *The Difference of Longit.* 100 *m. or* | 1 | 40 | Weſting |
| *Added, gives the Long. the Ship is in* | 7 | 14 | Weſt. |

Example 2.

*A Ship in Latitude* 41 *d.* 30 *m. North, and Longitude* 10 *d.* 20 *m. Eaſt, ſails theſe ſeveral Courſes and Diſtances, viz. S. E. by S.* 52 *Minutes, then S. S. W.* 63 *m. E. by N.* 47 *m. N. by E.* $\frac{1}{2}$ *E.* 35 *m. N. N. W.* $\frac{1}{4}$ *W.* 47 *m. W. N. W.* 73 *m. I demand the Courſe and Diſtance from the firſt Place of Departure, alſo the Latitude and Longitude ſhe is in?*

1. For the doing of which, obſerve the Work following:

| | | M. | Points. | M. |
|---|---|---|---|---|
| 1 | | 52 | 3 5 | 28.8 43.2 |
| 2 | | 63 | 2 6 | 24.2 58.5 |
| 3 | | 47 | 1 7 | 46.2 9.2 |
| | Courſe. As S. 8 Po. is to | | , ſo is S. | to 10.2 |
| 4 | | 35 | $1\frac{1}{2}$ $6\frac{1}{2}$ | 33.6 |
| 5 | | 47 | $2\frac{1}{4}$ $5\frac{3}{4}$ | 20. 42.5 |
| 6 | | 73 | 6 2 | 68. 28. |

2. Then collect the ſeveral Northings, Southings, Eaſtings and Weſtings into one, as here you ſee in the Table following; whereby you will have the Difference

ifference of Latitude and Departure from the Me-
dian.

| Courſes. | Diſt. | Diff. Lat. North | Diff. Lat. South | Departure. East | Departure. Weſt |
|---|---|---|---|---|---|
| 1. S. E. by S. | 52 | | 43.2 | 28.8 | |
| 2. S. S. W. | 63 | | 58.5 | | 24.2 |
| 3. E. by N. | 47 | 9.2 | | 46.2 | |
| 4. N. by E. $\frac{1}{2}$ E. | 35 | 33.6 | | 10.2 | |
| 5. N. N. W. $\frac{1}{4}$ W. | 47 | 42.5 | | | 20. |
| 6. W. N. W. | 73 | 28. | | | 68. |
| | | 113.3 | 101.7 | 85.2 | 112.2 |
| | | 101.7 | | | 85.2 |
| Diff. Lat. | | 11.6 | Departure | | 27.0 |

3. Now having the Diff. Lat. and the Departure
own, the Courſe and Diſtance is thus found;

m. m. d. d. m.
As 11.6 is to 27, ſo is T. 45 to T. 66.40: The
ourſe from the North Weſtward, or W. N. W.
areſt.

Here obſerve the Courſe is more than 45 degrees
om the Meridian, becauſe the Departure is more
an the Difference of Latitude; according to the
ote in the 6th *Caſe* of Plain Sailing: Then for the
iſtance, ſay,

d. m. m. d. m.
As S. 66.40 is to 27, ſo is S. 90 to 29.5: The
iſtance from the firſt Place of Departure.

| | d. | m. | |
|---|---|---|---|
| *Latitude departed from* | 41 | 30 | North |
| *The Diff. Lat. 11.6 m. or* | | 12 | North |
| *Added, gives the Latit. the Ship is in* | 41 | 42 | North |
| *And the middle Latitude is* | 41 | 36 | |
| *Subtracted from* | 90 | 00 | |
| *Leaves Compl. of middle Latitude* | 48 | 24 | |

4. Then to find the Difference of Longitude, say, As S. 48 d. 24 m. is to 27 m. so is S. 90 d. to 36 m. the Difference of Longitude.

| | d. | m. | |
|---|---|---|---|
| *The Longitude departed from is* | 10 | 20 | East. |
| *The Difference of Longitude 36 m. or* | | 36 | West |
| *Subtract, gives the Long. the Ship is in* | 09 | 44 | East. |

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*Secondly, In Mercator's Sailing.*

## CASE I.

*The Latitude and Longitude of two Places given; to find their Course and Distance.*

### Example.

*I demand the Course and Distance from the* Lizard *to* Barbadoes, *their Latitudes and Longitudes being supposed to be as follows:*

| | | d. m. | | | d. m. | |
|---|---|---|---|---|---|---|
| *Lizard* | Latit. | 50.10 | North. | Long. | 5.24 | W. |
| *Barbadoes* | | 13.10 | North. | | 57.24 | W. |
| The diff. Latitude -- | | 37. | | South. diff. long. | 52. | W. |
| | | 60 | | | 60 | |
| | | Minutes 2220 | | | Minutes 3120 | |

To

To anſwer this Queſtion, the Proportions are

As the Meridional Difference of Latitude is to Difference of Longitude, ſo is Radius to the gent of the Courſe.

As the Sine Complement of the Courſe is to Difference of Latitude, ſo is Radius to the Di- ce of the two Places.

he Meridional Difference of Latitude is thus d; Extend the Compaſſes in the Meridian from one Latitude to the other; that Extent ured in the *Equinoctial Line* (the Line next ng to the *Meridian Line*) gives the Meridional rence of Latitude.

hus the Extent from Lat. 50 d. 10 m. to Lat. 10 m. in the firſt, being meaſured on the latter, deg. or 2700 min. the Meridional Difference titude: Then it is,

d. d.

00 m. is to 3120 m. } ſo is T. 45 to T. 49. The
As 45 d. is to 52 d. }

ſe from the South Weſtward, or S. W. 4 deg. erly. And again,

S. 41 is to 2220 m. ſo is S. 90 d. to 3390 m.
As S. 41 d. is to 37 d. ſo is S. 90 d. to 56 d.
. ſo that the Diſtance is 56 d. 30 m. or 3390 tes.

CASE

## CASE II.

*Both Latitudes and Course given; to find the Distance and Difference of Longitude.*

*The Proportions are these;*

1. AS the Sine Complement of the Course is to the Difference of Latitude, *&c.* as before in the 2d *Case* of Plain Sailing, to find the Distance and the Departure from the Meridian.

2. As the Sine Complement of the middle Latitude is to the Departure, so is Radius to the Difference of Longitude.

Or thus; As the Sine Complement of the Course is to the Meridional Difference of Latitude, so is the Sine of the Course to the Difference of Longitude.

### Example.

*Admit from the* Lizard *in* 50 *d.* 10 *m. North Latitude, and Longitude* 5 *d.* 24 *m. West, we made* (*with Lee-way Variation allowed for*) *our Course to be South* 39 *d. Westerly, and then by Observation is in Latitude* 45 *d.* 11 *m. North; I demand her Distance run, and what Longitude she is in?*

| | | | |
|---|---|---|---|
| *Latitude departed from* —— | 50 d. | 10 m. | North. |
| *Latitude by Observation* —— | 45 | 11 | North. |
| *Subtract, is the Diff. of Latitude* | 4 | 59 | Southerly. |
| | 60 | | |
| minutes | 299 | | |
| *The middle Latitude is* —— | 47 d. | 40 m. | |
| *Subtract from* —— | 90 | | |
| *Leaves Comp. of the middle Lat.* | 42 | 20 | |

As S. 51 d. is to 299 m. ſo is S. $\left\{\begin{matrix}90\\39\end{matrix}\right\}$ d. to $\left\{\begin{matrix}385\text{ m. Diſt.}\\242\text{ m. Dep.}\end{matrix}\right.$

2. S. 42 d. 20 m. is to 242 m. ſo is S. 90 d. to 8 m. the Difference of Longitude: Or thus, The ent from 50 d. 10 m. to 45 d. 11 m. in the Me- ian Line, meaſured in the equal Parts, is 7 d. m. or 440 m. for the Meridional Difference of itude: Then,

As S. 51 d. is to 440 m. ſo is S. 39 d. to 358 m. thus,

As 299 m. is to 242 m. ſo is 440 m. to 358 m. as fore, which is the Difference of Longitude.

| | d. | m. | |
|---|---|---|---|
| *Longitude departed from* —— | 5 | 24 | Weſt. |
| *Difference of Long.* 358 *m. or* —— | 5 | 58 | Weſt. |
| *ded, gives the Long. the Ship is in* —— | 11 | 22 | Weſt. |

## CASE III.

*Both Latitudes, and Diſtance given; to find the Courſe and Difference of Longitude.*

*To perform this, the Proportions are theſe;*

AS the Diſtance is to Radius, ſo is the Difference of Latitude to the Sine Complement the Courſe; as in the 4th *Caſe* of Plain Sailing, which alſo you may find the Departure or Meridional Diſtance.

2. As the Sine Complement of the middle Latitude is to the Departure, ſo is Radius to the Difference of Longitude: Or thus,

As

As the Difference of Latitude is to the Departu
ſo is the Meridional Difference of Latitude to
Difference of Longitude.

Example.

*A Ship in Latitude 46 d South, and Longitude*
*15 m. Weſt, ſails 100 Leagues North Eaſtward,*
*then by Obſervation is in Latitude 42 d. South; I*
*mand her Courſe, Departure, and Longitude ſhe is in?*

*Latitude departed from is* 46 d. South.
*Latitude by Obſervation is* 42 d. South.
*Subtract, gives the diff. lat.* —4 d. *or* 80 Leagues.
*The middle Latitude is* —44 d. whoſe Comp. is 46

1. As 100 leag. is to S. 90 deg. ſo is 80 leag.
S. 53 deg. 15 min. the Complement of the Courſe
ſo that the Courſe is 36 deg. 45 min. North Eaſt
ward, or N. E. by N. $\frac{1}{4}$ E. And then again,

As S. 90 deg. is to 100 leag. ſo is S. 36 deg.
min. to 60 leag. the Departure from the Meridian.

2. As S. 46 deg. is to 60 leag. ſo is S. 90 deg.
83 leag. the Difference of Longitude: Or thus, Th
Extent from 46 deg. to 42 deg. on the Meridi
Line, makes 5 deg. 30 min. or 100 leag. (on th
equal Parts) which is the Meridional Difference
Latitude: And then it's,

As 80 leag. is to 60 leag. ſo is 110 leag. to 83 leag. } diff. lo
Or, As 4 deg. is to 3 d. ſo is 5 d. 30 m. to 4 d. 9 m. }

*Longitude departed from is* —— ——1 *d.* 15 *m.* Wes
*The Diff. of Longitude* 83 *leag. or* ——4 *d.* 9 *m.* Eaſt.
*Subtract, gives Longitude Ship is in* —2 *d.* 54 *m.* Eaſt.

CAS

## CASE IV.

*Latitudes and Departure given; to find the Course, Distance, and Difference of Longitude.*

THe Course and Distance, is found by the *6th Case* of Plain Sailing.

The Difference of Longitude is found as in the *1st Case*, or any other *Case* in *Mercator*.

### Example.

*A Ship in Latitude* 33 *d. North, and Longitude* 178 *d. She sails South Westward until she be departed from the Meridian* 58 *Leagues, and then she is in Latitude* 36 *m. North; I demand her Course, Distance, and what Longitude she is in?*

| | d. | m. | |
|---|---|---|---|
| *Latitude departed from* — | 33 | | North. |
| *Latitude she is in* — | 28 | 36 | North. |
| *Difference of Latit. is* — | 4 | 24 | *or* 88 Leagues. |
| *Middle Latitude is* — | 30 | 48 | the Comp. 59. 12. |

As 88 leag. is to 58 leag. so is T. 45 d. to T. 20 m. which is the Course South Westerly, W. by S.

As S. 33 d. 20 m. is to 58 leag. so is S. 90 d. to 103 leag. the Distance sail'd.

The Meridional Difference of Latitude is 5 d. or 103 leag.

As { S. 59 d. 12 m. / 88 Leagues } is to 58 Leagues, so is { S. 90 d. / 103 leag. } to 103 Leagues, the Difference of Longitude.

5. Long-

| | d. | m. | |
|---|---|---|---|
| 5. *Longitude departed from is* —— | 178 | 0 | Weſt. |
| *The Diff. of Long. 67 leag. or* —— | 3 | 21 | Weſt. |
| *Added, and the Sum is* —— | 181 | 21 | |
| *Which ſubtract from* —— | 360 | 0 | |
| *Remainder is Long. the Ship is in* —— | 178 | 39 | Eaſt. |

## CASE V.

*One Latitude, Courſe and Diſtance given; to find the other Latitude and Difference of Longitude.*

1. THe Difference of Latitude, and Departure from the Meridian, is found by the firſt Case of Plain Sailing; and conſequently the other Latitude.

2. The Difference of Longitude is found as before in the 2d or 3d *Caſe* of *Mercator*.

### Example.

*If a Ship ſails S. E. by S.* 120 *Leagues, from a Port in Latitude* 53 *d.* 30 *m. North, and Longitude* 2 *d.* 15 *Weſt; What Latitude, and Longitude is ſhe now in?*

1. As S. 8 Pts. to 120 leag. ſo is S. { 5 / 3 } Pts. to { 100 leag. diff. L. / 67 leag. Depar.

| | d. | m. | |
|---|---|---|---|
| 2. *Latitude departed from is* —— | 53 | 30 | North. |
| *The Diff. of Lat.* 100 *leag. or* —— | 5 | | |
| *Subtract, gives Lat. ſhe is in* —— | 48 | 30 | North. |
| *And the middle Latitude is* —— | 51 | | Comp. 39 |

3. *The Meridional Diff. Lat. is* 8 *d. or* 160 Leagues.

4.

{S. 39 d. / 100 leag.} is to 67 leag. ſo is {S. 90 d. / 160 leag.} to 106 leag. 5 Difference of Longitude.

| | d. | m. | |
|---|---|---|---|
| *Longitude departed from is* —— | 2 | 15 | Weſt. |
| *Diff. Long.* 106.5 *leag. or* —— | 5 | 20 | Eaſting. |
| *Extract, gives Longit. ſhe is in* —— | 3 | 5 | Eaſt. |

## CASE VI.

*Sailing in [illegible] Parallel; to find the Difference of Longitude.*

*To do this, the Proportion is thus;*

The Sine Complement of the Parallel or Latitude is to the Diſtance ſail'd (Eaſt or Weſt), as Radius to the Difference of Longitude.

### Example.

*A Ship ſails Weſt* 390 *minutes in the Latitude of* 10 *m. and departs from the Longitude of* 2 *d. Eaſt; I demand what Longitude the Ship is now*

As S. 39 d. 50 m. is to 390 m. ſo is S. 90 d. to 610 m. the Difference of Longitude.

| | d. | m. | |
|---|---|---|---|
| *Longitude departed from is* —— | 2 | 45 | Eaſt. |
| *Diff. Long.* 610 *m. or* —— | 10 | 10 | Weſting. |
| *Extract, gives Long. ſhe is in* —— | 7 | 25 | Weſt. |

CASE

## CASE VII.

*The Difference of Longitude given, of two Places in Parallel or Latitude; to find their Diſtance in that Parallel.*

*The Proportion is thus;*

AS Radius is to the Difference of Longitude, is the Sine Complement of the Latitude to Diſtance in that Parallel.

### Example 1.

*Suppoſe* Cape Vincent *in* Portugal, *and* Cape Henry *in* Virginia, *both in the Latitude of* 37 *North; their Longitudes are ſuppoſed to be as follows;*

Cape *St.* Vincent } *Longitude* { 8 d. 25 m. Weſt
Cape Henry — } { 74 d. Weſt

*What is their Diſtance in their Parallel?*

| | d. | d. m. | |
|---|---|---|---|
| 1. Latitude is 37 North, —— Longitudes are-- | | 8 25 | Weſt |
| Take from | 90 —— | 74 | Weſt |
| Comp. Lat. | 53 The Diff. Long. is | 65 35 | |

| | d. | d. | d. m. | | d. m. | |
|---|---|---|---|---|---|---|
| 2. As S. 90 is to S. 53, ſo is | | | 65 35 / 3935 m. | to | 52 30 / 3150 m. | |

Diſtance required.

### Example 2.

*Suppoſe two Ships under the Equinoctial, and* Leagues *aſunder, and each ſails North till both*

*Latitude 60 d. How far are they now aſunder?*
wer, 50 *Leagues.* For it is,
s S. 90 d. is to S. 30 d. ſo is 100 leag. to 50
the Diſtance required.

## CASE VIII.

*ſind how many Minutes or Miles make a Degree of Longitude, in any Parallel or Latitude.*

*The Rule.*

S Radius is to the Sine Complement of the Latitude, ſo is 60 minutes (a degree in the Equial) to the minutes making a degree of Longirequired.

Example.

*the Latitude of 50 d. I demand how many minutes Eaſting or Weſting) make a degree of Longitude?*
wer, $38\frac{1}{2}$ *minutes.* For it is,

d. d. m. m.

s S. 90 is to S. 40, ſo is 60 to 38.5 or $38\frac{1}{2}$, to e one degree of Longitude in Latitude 50 d.

*This may be done by the Plain Scale thus;*

ake the given Latitude from the Chords, and ſured on the Line M.L. (which is miles of Londe) ſheweth your deſire: ſo here take 50 d. the Chords, and meaſure on the Scale M L. eweth $38\frac{1}{2}$ m. as before.

## VI. *The Uſe of* Gunter's *Scale in Aſtronomy.*

### PROB. I.

*The Sun's Place in the Ecliptick, and his greateſt Declination given; to find his Right Aſcenſion, and Preſent Declination.*

*To perform this, theſe are the Proportions;*

1. AS Radius is to the Sine Complement of the Sun's greateſt Declination, ſo is the Tangent of his Longitude (from the neareſt Equinoctial Point) to the Tangent of his Right Aſcenſion (from the ſaid Point).

*Note* 1. The Sun's greateſt Declination is 23 30 m.

2. The beginning of ♈ and ♎ are the two Equinoctial Points.

3. This Proportion (above) finds the Sun's Right Aſcenſion only when he is in the firſt quarter of the Ecliptick; that is, ♈, ♉, or ♊: But when he is in the ſecond quarter, ♋, ♌, or ♍, ſubtract it from 180 d: and when in ♎, ♏, or ♐, add to 180 d: And in the laſt quarter, ♑, ♒, or ♓, ſubtract (what's found by this Operation) from 360 d. ſo will you have the Sun's Right Aſcenſion from ♈ (for any Place of the Ecliptick) deſired.

2. As Radius is to the Sine of the Sun's Longitude (from the neareſt Equinoctial Point) ſo is the Sine

Sine of his greateſt Declination to the Sine of his preſent Declination.

*Note*; The Sun being in ♈, ♉, ♊, ♋, ♌, or ♍, his Declination is North; but in ♎, ♏, ♐, ♑, ♒, or ♓, it's South.

Example.

*When the Sun's Place in the Ecliptick is* ♉ 24 *d.* 15 *m. What is his Right Aſcenſion, and Declination?*

The Sun being in ♉ 24 d. 15 m. his Longitude from the neareſt Equinoctial Point (being now the beginning of ♈) is 54 d. 15 m. And the Complement of his greateſt Declination always is 66 d. 30 m. Then it follows;

1. As S. 90 d. is to S. 66 d. 30 m. ſo is T. 54 d. 15 m. to T. 51 d. 50 m. the Sun's Right Aſcenſion (from the beginning of ♈) required.

*By Gunter with Compaſſes.*

The Extent from 90 d. to 66 d. 30 m. in the Line of Sines, will reach in the Line of Tangents, from 54 d. 15 m. to 51 d. 50 m. the Right Aſcenſion.

*By ſliding Gunter.*

1. Let the middle Piece be ſo put in, that Sines may ſlide againſt Sines, and Tangents againſt Tangents.

2. Then bring 90 d. in Sines (on the outſide Piece) againſt 66 d. 30 m. in Sines (on the middle Piece); then againſt 45 d. 15 m. in Tangents) on the ſecond Piece) is 51 d. 50 m. in Tangents (on the outſide Piece), the Right Aſcenſion as above.

This Proportion being to be wrought on Sines and Tangents jointly, I thought it neceſſary to expreſs the manner of its Operation on both ſorts of Gunters, that the Learner might ſee how it agrees with the General Rule given at the beginning of this Diſcourſe of the Gunter; but ſhall wave it in the reſt, and only write the Proportions in Words and in Figures, according to the particular Examples; as here follows for the Sun's Declination in the foregoing Example.

2. As S. 90 d. is to S. 54 d. 15 m. ſo is S. 23 d. 30 m. to S. 18 d. 52 m. the Sun's Declination North.

## PROB. II.

*The Latitude of a Place, and the Sun's Declination given; to find his Amplitude, and Aſcenſional Difference; and conſequently his Riſing or Setting, and the Length of the Day or Night.*

*To perform this Problem, the Proportions are theſe;*

1. AS the Sine Complement of the Latitude is to Radius, ſo is the Sine of the Sun's Declination to the Sine of his Amplitude.

*Note*, The Amplitude and Declination are always of one kind; that is, both North or both South.

2. As Radius is to the Tangent of the Latitude, ſo is the Tangent of the Sun's Declination to the Sine of his Aſcenſional Difference.

*Note* 1. The Aſcenſional Difference (being reduced into Time, by allowing 15 degrees for one hour, and then) added to, and ſubtracted from 6 hours, the one is Sun-riſing, the other his Setting.

2. If

2. If Latitude and Declination are both North, or both South, the Sun riſeth before, and ſets after 6 of the Clock; but if one be North, and the other South, the contrary.

3. If the Riſing and Setting be doubled ſeverally, the firſt is the Length of the Night, and the latter the Length of the Day.

4. By this Problem were the Tables of Amplitudes, and Semidiurnal Arches, *&c.* calculated.

Example.

*Latitude 51 d. 32 m. North, and the Sun's Declination 23 d. 30 m. North; I demand his Amplitude and Aſcenſional Difference? alſo his Riſing, Setting; Length of the Day and Night?*

| | | d. | m. | | d. | m. |
|---|---|---|---|---|---|---|
| *Anſw.* | His Amplitude | 39 | 50, | Aſcenſi. Diff. | 33 | 10 |
| | Sun-ſetting hr. | 8 | 13, | length of Day | 16 | 26 |
| | Sun-riſing hour | 3 | 47, | length Night | 7 | 34 |

For it is thus,

1. As S. 38 d. 28 m. is to S. 90 d. ſo is S. 23 d. 30 m. to S. 39 d. 50 m. the Amplitude North, becauſe the Declination is North.

2. As T. 45 d. is to T. 51 d. 32 m. ſo is T. 23 d. 30 m. to T. 28 d. 40 m. againſt which, in S. is 33 d. 10 m. the Aſcenſional Difference; which being reduced into Time, is 2 hours 13 minutes; and added to 6 hours, is 8 hours 13 minutes, Sun-ſetting; which doubled, is 16 hours 26 minutes, the length of the Day.

Again, 2 hours 13 min. ſubtracted from 6 hours, is 3 hours 47 min. Sun-riſing; which doubled, is 7 hours 34 min. length of the Night.

## PROB. III.

*Latitude of a Place, and the Sun's Declination given; to find his Altitude and Azimuth at 6 of the Clock.*

*To ſolve this Problem, ſay;*

1. AS Radius is to the Sine of the Latitude, ſo is the Sine of his Declination to the Sine of his Altitude, at 6 of the Clock.

2. As Radius is to the Sine of the Complement of the Latitude, ſo is the Tangent of the Sun's Declination to the Tangent of his Azimuth (from the Eaſt or Weſt) at 6 of the Clock.

*Note*; The Azimuth is from the Eaſt at 6 in the Morning, and from the Weſt at 6 after Noon: Northerly in North Latitude, but Southerly in South.

### Example.

*In Latitude 51 d. 32 m. North, the Sun's Declination being 23 d. 30 m. North; What is his Altitude and Azimuth at 6 of the Clock?*

*Anſwer*; His Altitude is 18 d. 12 m. and his Azimuth is 18 d. 10 m. Northerly, or 74 d. 50 m. North Eaſterly or Weſterly. For it is thus,

1. As S. 90 d. is to S. 51 d. 32 m. ſo is S. 23 d. 30 m. to S. 18 d. 12 m. the Altitude at 6 of the Clock.

2. As

2. As S. 90 d. is to S. 38 d. 28 m. ſo is T. 23 d. m. to T. 15 d. 10 m. the Azimuth at 6; that is, d. 50 m. North Eaſterly in the Morning; but orth Weſterly in the Evening.

## PROB. IV.

*itude of a Place, and the Sun's Declination given; to find his Altitude, and Hour of the Day when he is Eaſt or Weſt.*

*To perform this, the Proportions are theſe;*

AS the Sine of the Latitude is to Radius, ſo is the Sine of the Sun's Declination to the Sine his Altitude; being Eaſt or Weſt.

2. As Radius is to the Tangent Complement of e Latitude, ſo is the Tangent of the Sun's Declination to the Sine of the Hour from 6 of the Clock, hen he is Eaſt or Weſt.

*Note* 1. The Sun is Eaſt after 6 in the Morning, ut Weſt before 6 in the Evening.

2. The Hour found by the laſt Proportion being educed into Time (by allowing 15 d. to an Hour) nd added to, or ſubtracted from 6, giveth the Hour of the Day required.

### Example.

*In Latitude* 51 *d.* 30 *m. North, the Sun's Declination being* 23 *d.* 30 *m. North; What is his Altitude? and what time of the Day is it when he is Eaſt or Weſt?*

*Anſw.* His Altitude is 30 d. 35 m. and the Hour of the Day is { 7 h. 21 m. Morning, when Eaſt. / 4 h. 39 m. Evening, when Weſt.

For it is thus,

1. As S. 51 d. 32 m. is to S. 90 d. ſo is S. 23 d. 30 m. to S. 30 d. 35 m. the Sun's Altitude being either East or Weſt.

2. As T. 45 d. is to T. 38 d. 28 m. ſo is T. 23 d. 30 m. to S. 20 d. 15 m. The Hour from 6, which is 1 hour 21 minutes, added to 6, is 7 h. 21 m. and ſubtracted from it, is 4 h. 39 m. the former is the Time when East in the Morning, the latter the Time in the Evening when he is Weſt.

## PROB. V.

*The Sun in the Equator or Equinoctial, (that is, when he hath no Declination) the Latitude of a Place, and his Altitude given; to find his Azimuth, and Hour of the Day.*

*This Problem is thus effected;*

1. AS Radius is to the Tangent of the Latitude, ſo is the Tangent of the Sun's Altitude to the Sine of the Complement of his Azimuth, from the South in North Latitude; but from the North in South Latitude; Eaſterly in the Forenoon, and Weſterly Afternoon.

2. As the Sine of the Complement of the Latitude is to Radius, ſo is the Sine of the Sun's Altitude to the Sine of the Complement of the Hour from Noon.

Example.

*In Latitude 51 d. 32 m. the Sun having no Declination, and his Altitude being 21 d. 50 m. in the Forenoon; I demand his Azimuth, and the Hour of the Day?*

*Anſw.*

*Anſw.* His Azimuth is 59 d. 45 m. South Eaſter-
and the Hour of the Day is hour 8.33 m. Morn-
For it is thus,
. As T. 45 d. is to T. 51 d. 32 m. ſo is T. 21 d.
m. to S. 30 d. 15 m. whoſe Complement is 59 d.
m. the Sun's Azimuth required.
. As S. 38 d. 28 m. is to S. 90 d. ſo is S. 21 d.
m. to S. 36 d. 50 m. whoſe Complement is 53 d.
m. or 3 hours 23 minutes; which ſubtracted
m 12, gives 8 hours 33 minutes, or 33 minutes
r 8 of the Clock in the Forenoon, the Time of
Day required.

## PROB. VI.

*itude of a Place, Sun's Declination, and his Alti-
ude given; to find his Azimuth, and the Hour of
he Day.*

*The Performance of this, is thus;*

TAke the Complement of the Latitude, the Complement of the Altitude, and the Sun's ance from the Pole, (which is his Declination ded to 90 d. when the Latitude and Declination is North, the other South; but both being either rth or South, it's the Complement of the Decli-ion; and) add them together into one Sum.

2. From $\frac{1}{2}$ that Sum, ſubtract (to find the Azi-th) the Sun's Diſtance from the Pole; but (to d the Hour) the Complement of his Altitude, and te the Remainder.

3. *To*

3. *To find the Azimuth, you have theſe two Propo-tions following*;

1. As Radius is to the Sine of the Compleme of the Latitude, ſo is the Sine of the Complement the Altitude to a 4*th* Sine. Then again,

2. As that 4*th* Sine is to the Sine of the ½ Sum, is the Sine of the Remainder to a 5*th* Sine; again which, in Verſed Sines, is the Sun's Azimuth fro the North in North Latitude; but from the Sou in South Latitude.

4. *To find the Hour, theſe are the Proportions wh follow*;

1. As Radius is to the Sine of the Complement the Latitude, ſo is the Sine of the Sun's Diſtan from the Pole to a 4*th* Sine.

2. As that 4*th* Sine is to the Sine of the ½ Sum ſo is the Sine of the Remainder to a 5*th* Sine; gainſt which, in Verſed Sines, is the Hour of the D from Noon.

Example.

*In Latitude* 51 *d.* 30 *m. North, the Sun's Declinati being* 15 *d.* 10 *m. North, and his Altitude obſerved to* 11 *d.* 30 *m. I demand his Azimuth, and Hour of t Day?*

| 90 d. | 90 d. | 90 d. |
|---|---|---|
| Latitude — 51.30 | North Declination — 15.10 | North Alt. 11.3 |
| Comp. Lat. 38.30 | Sun's Diſt. from Pole 74.50 | Comp. Alt. 78.3 |
| Comp. Alt. 78.30 | Comp. Latitude —— 38.30 | |
| Sun's Diſt. 74.50 | Comp. Altitude —— 78.30 | |
| Sum is — 191.50 | Sum is —————— 191.50 | |
| ½ Sum is — 95.55 | The ½ Sum is ——— 95.55 | |
| Remaind. — 21.05 | Remainder is ——— 17.25 | |

T

*Then to find the Azimuth, it is thus;*

As Sine 90 d. is to Sine 38 d. 30 m. ſo is Sine 30 m. to Sine 37 d. 20 m.
As Sine 37 d. 20 m. is to Sine 95 d. 55 m. ſo 21 d. 5 m. to Sine 36 d. againſt which, in Sines, is 80 d. the Sun's Azimuth from the Eaſterly, if in the Forenoon, but Weſterly Evening.

*And to find the Hour of the Day it is thus;*

As Sine 90 d. is to Sine 38 d. 30 m. ſo is Sine 50 m. to Sine 37 d.
As Sine 37 d. is to Sine 95 d. 55 m. ſo is Sine 25 m. to Sine 29 d. 40 m. againſt which, on Sines, is 90 d. 30 m. or 6 hours 2 minutes, is the hour from Noon; that is, 58 minutes of the Clock in the Morning, or 2 minutes in the Afternoon.

# *The Deſcription and Uſe of the* SECTOR.

## *The* Sector *deſcribed.*

1. THIS uſeful Inſtrument may be of Length, but is commonly made Foot, 18 Inches, or 2 Foot long, to o in a Joint in the middle, like a Carpenter's Ru one Inch and a half (or more) in breadth, an any thickneſs at pleaſure, according to the ma it's made of; which may be either *Boxwood*, I *Braſs* or *Silver*.

2. There are two ſorts of *Sectors*, known by names of *Gunter's*, and *Foſter's Sector*; and are ſo times both put on one Inſtrument; that is, *Gun Sector* on one ſide of it, and *Foſter's* on the other.

3. The Lines of *Gunter's Sector* are theſe, *Lin Lines* (marked at the end with L.) *Line of S* (marked S.) *Superficies* (marked Sup.) *S* (marked Sol.) Line of *Metals*, Line of *Equa Bodies*, Line of *Inſcribed Bodies*, &c.

4. The Lines of *Foſter's Sector*, are theſe 5; *Line of Lines* or *Equal Parts*, *Chords*, *Sines*, *Tange*

ants; each marked at the end with its name, Letter of its name.

ll *Sector Lines* or *Scales*, meet at the center Head (where the Joint is) at the left hand, m thence are figured towards the right, each wice repeated; that is, one on each Leg or the *Sector* anſwering one another.

The *Sector* is uſeful in Projection, and in Pro- ; in Projection, to reduce, or to make a to any (poſſible) Magnitude; in Propor- o work any ſtated Canon or Analogy in *A- ick, Geometry, Trigonometry, Navigation, Aſtro-* c. of which I will give a brief Touch, yet ſo Learner may be informed how to apply it .

### *The Uſe of the Sector Lines for Projection.*

rojections it's often required to inlarge, or di- iſh the Scale, that the Draught deſigned may its deſired magnitude; in the doing of which, ed Lateral and Parallel Diſtances, or Extents Compaſſes: And to avoid a needleſs ſaying he ſame things, take once for all what is meant *Lateral* and a *Parallel Diſtance*, or *Extent of the* ſſes.

A *Lateral Diſtance* (in any Line or Scale) is xtent or Diſtance (taken along the length of ine) from the beginning thereof to any Num- therein) deſired.

for Example: The *Lateral Sine* of 30 d. is Diſtance of 30 from the beginning of the *Line*

of

*of Sines*; and ſo is it in the *Line of Equal-parts*, C
*Tangents*, *Secants*, &c.

2. A *Parallel Diſtance* (in any Line or Sca
the Sector) is the Extent or Diſtance (taken ac
from any Number in any Line on one Leg o
Sector, to the like Number in the like Line on t
ther Leg.

Or, the neareſt Diſtance from any Numb
one Leg (taken acroſs) to the like Line on t
ther Leg.

As for Example; The *Parallel Sine* of 30
(ſuppoſing the *Sector* open'd to any Angle) th
ſtance from 30 in the *Line of Sines* on one Le
30 in the *Line of Sines* on the other Leg.

Or, the neareſt Diſtance from 30 in the *L*
*Sines* on one Leg, to the *Line of Sines* (that is to
the Line iſſuing from the center of the Joint or H
on the other Leg, is the *Parallel Sine* of 30 d. In
manner is it done in any other Line.

This being underſtood, the inlarging or dim
ing of any of the Lines; or the finding a C
Sine, Tangent or Secant, to any propoſed Ra
will not be difficult; yet for the Learner's furth
tisfaction, take a General Rule.

*To find a Chord, Sine, Tangent or Secant, &c. t*
*Radius (greater or leſſer) propoſed.*

The General Rule is thus;

1. Take the propoſed Radius in the Comp
and make it a Parallel on the *Sector* in the Rad
any one Line: that is, open the *Sector* till the

d Radius (in the Compaſſes) be a *Parallel Chord* o d. in the *Line of Chords*; or a *Parallel Sine* of in the *Line of Sines*; or a *Parallel Tangent* of in the *Line of Tangents*; or a *Parallel Secant* of in the *Line of Secants*; for the Chord of 60, of 90, Tangent of 45, and Secant of o d. are e- and each equal to Radius.

The *Sector* being kept at that open'd Diſtance Angle, any Parallel Diſtance in any Lines, will Lateral Diſtance on a like Line to the propoſed ius: that is, a Parallel Chord of 10, 20, 30, *&c.* e Chord of 10, 20, 30, *&c.* to the propoſed Ra- ; alſo, a Parallel Sine, Tangent and Secant, of 30, 40, *&c.* is the Sine, Tangent and Secant of 30, 40, *&c.* to the foreſaid Radius.

2. *The Uſe of the* Sector *in working Proportions.*

Uppoſing the Learner underſtands how to take *Lateral Diſtance* on the Line of Lines (other- called Equal parts) on the Chords, Sines, *&c.* to apply them Parallel in any Line on the *Sector*; working of any Proportion is thus:

*A General Rule to work by the* Sector.

1. Take the 2*d* Term Lateral, (that is, from the inning of the Line to the propoſed 2*d* Term) and ning the *Sector*, apply that extent Parallel (that acroſs it) in the 1*ſt* Term, there ſtay the *Sector* that Parallel Extent.

2. Then

2. Then the Parallel Diſtance taken in the 3 Term, and meaſured laterally, gives the 4*th* Ter ſought for or required.

Or briefer thus;

As the Lateral 2*d* Term to the Parallel 1*ſt* Ter ſo is the Parallel 3*d* Term to the Lateral 4*th* Term.

This one Rule is ſufficient for any Proporti whatever, and will appear ſo by a few Examples.

## PROB. I.

*To multiply by the Line of Lines on a* Sector.

*The Proportion is;*

AS 1 to the Multiplicand, ſo is the Multiplier t the Product.

Example.

*What's the Product of* 8 *multiplied by* 4?

*The Analogy, or Proportion, is this;*

As 1 to 8, ſo is 4 to the Product 32, thus found t the *Sector* and General Rule aforeſaid.

1. In the Line of Lines, that is, the Line of E qual-parts, take the 2*d* Term 8 Lateral; that from the Center of the Joint, and the beginning the Line, to 8 in the ſame Line.

2. Open the *Sector* till you fit the (foreſaid L teral) Diſtance in the Compaſſes a *Parallel* in 1 a 1, or 10 and 10; that is, ſet it over from 10 to 1 at the end of the ſame Line, and now counted for and 1, the firſt Term; keep the *Sector* juſt at th Angle or opening.

3. T

The *Parallel Diſtance* of the 3*d* Term 4; that from 4 to 4 taken acroſs from one Leg to the r in the ſaid Line of Lines; and meaſured La- l (which is from the beginning of the Line to- ds the end, and) it's 32, the 4*th* term or pro- of 8 multiplied by 4. Or ſhorter thus; s the 2*d* term 8 (*Lateral* taken) to the 1*ſt* 10 (*Parallel* ſet), ſo is the 3*d* term (*Parallel* n in) 4, to the 4*th* term (laterally meaſured, 32, the Product as before. Or thus; the Lateral 4 to the Parallel 10, counted for ſo is the Parallel 8 to 32, as before.

## PROB. II.

*To divide by the Line of Lines on a* Sector.

*The Analogy or Proportion is this*;

S the Diviſor is to 1, ſo is the Dividend to the Quotient. Or thus,

s the Diviſor to the Dividend, ſo is 1 to the tient.

Example.

*How many ſquare Yards are in* 36 *ſquare Feet?* ver, 4 *ſquare Yards.* For it is thus,

s 9 is to 1, ſo is 36 to the Quotient 4; thus to rought by the *Sector*:

s Lateral 1 is to Parallel 9, ſo is Parallel 36 to ral 4, the Yards required.

## PROB. III.

*To work the Rule of 3 by the Line of Lines on a Sector or unto 3 Numbers given, to find a 4th in Geometrical Proportion.*

*The Analogy is,*

AS the 1*st* term is to the 2*d* term, so is the 3*d* term to the 4*th* term required.

Example 1.

*If the Diameter of a Circle be* 14 *Inches; What is the Circumference?* Answer, 44 *Inches.* For the Proportion is this;

As 7 to 22, so is the Diameter 14 to 44, the Circumference required; by *Sector* thus wrought:

As Lateral 22 to Parallel 7, so is Parallel 14 to Lateral 44, the Circumference of a Circle whose Diameter is 14.

Example 2.

*If a Plank or Board be* 15 *Inches broad, and* 20 *Feet long; How many Feet is in it?* Answer, 25 *Feet.* For the Proportion is this:

As 12 to 15 the breadth, so is 20 the length to 25 Feet, the Content of the Board; and by *Sector* thus to be wrought:

As Lateral 15 to Parallel 12, so is Parallel 20 to Lateral 25 Feet, the Content of the Plank.

Example 3.

*A Ship being in* 42 *d.* 20 *m. North Latitude, she sails N. E. by N.* 104 *Leagues: I demand the Latitude she is in, and her Departure from the Meridian?*

The

The Canons or Proportions are theſe ;

1. As Radius to the Diſtance ſail'd, ſo is the Sine the Courſe to the Departure from the Meridian.

That is, by the *Sector* thus ;

As *Lateral* 104 Leagues (from the Line of Lines) *Parallel* Sine of 90 d. ſo is *Parallel* Sine of 33 d. m. (the degrees of the Courſe from the Meridian) *Lateral* 58 Leagues (on the Line of Lines) the parture from the Meridian.

*Note*, If 104 Leagues, taken Lateral, be trouble- to fit Parallel in Sine of 90 d. then take its , or quarter Lateral; and the Anſwer will be rdingly its half or quarter: as here, if you 52, the half of 104 L; the Anſwer would be whoſe double is 58 for the Departure from the idian, as before.

2. As Radius to the Diſtance ſail'd, ſo is the Sine mplement of the Courſe to the Difference of La- de.

*By the* Sector *thus* ;

s *Lateral* 104 Leagues is to Parallel Sine of 90 d. is *Parallel* Sine of 56 d. 15 m. to *Lateral* 87 gues, the Difference of Latitude by which you find the Latitude the Ship is in, as before in the of the Gunter.

Example 4.

*A Ship ſails South Eaſterly till her Difference of La- de be* 275 *minutes, and the Departure be* 412 *mi- ; I demand her Courſe and Diſtance ſail'd?*

The Canons are theſe;

1. As the Difference of Latitude is to the Departure, ſo is Radius to the Tangent of the Courſe.

That is, *By the* Sector *thus*;

As *Lateral* 412 minutes is to *Parallel* 275 minutes, ſo is *Parallel* Tangent of 45 degrees (that being Radius now) to *Lateral* Tangent of 56 d. 15 m. the Courſe from the Meridian, which makes S. E. by E.

2. As the Sine of the Courſe is to the Departure, ſo is Radius to the Diſtance ſail'd.

*By the* Sector *thus*;

As *Lateral* 412 minutes is to *Parallel* Sine 56 d. 15 m. ſo is *Parallel* Sine of 90 degrees (that now being Radius) to *Lateral* 495 minutes, the Diſtance ſail'd.

After this manner may any Proportion be wrought by the *Sector*, which I leave for the Learner's Exerciſe.

## A TABLE containing the Chief Harbours, Headlands and Iſlands in the World; ſhewing their Latitude and Longitude: Beginning the ſaid Longitude at the Meridian of London, newly Compoſed. By Andrew Wakely, Math.

### The Sea Coaſts of Greenland.

| Names of Places. | Latitude. D. | M. | Longitude. D. | M. |
|---|---|---|---|---|
| Hacluits Headland | 79 | 50 | 14 | 10 |
| Fair Foreland | 79 | 15 | 14 | 05 |
| Cape Cold the North-end of Cherry Iſle | 79 | 00 | 12 | 32 |
| Black point, South end of it, | 78 | 32 | 13 | 10 |
| Dear Sound | 79 | 15 | 15 | 00 |
| Foule Sound | 77 | 38 | 14 | 20 |
| Bell Sound | 77 | 34 | 15 | 39 |
| Horn Sound | 77 | 07 | 15 | 30 |
| Point Lookout | 76 | 25 | 15 | 50 |
| Helies Sound | 79 | 27 | 18 | 20 |
| Cape Barcam | 78 | 35 | 18 | 02 |
| Cape Blanco | 78 | 10 | 18 | 30 |
| Ducks Cove } Edges Iſ- | 77 | 45 | 19 | 10 |
| Negro Point } land. | 77 | 10 | 22 | 30 |
| Hopeleſs Iſles | 77 | 00 | 21 | 00 |
| Hope Iſland | 76 | 23 | 22 | 12 |
| Cherry Iſland | 74 | 44 | 19 | 08 |

North Latitude. East Longitude.

## Nova Zembla.

| *Names of Places.* | Latitude. D. | M. | Longitude. D. | M. |
|---|---|---|---|---|
| Ice Point | 78 | 10 | 66 | 10 |
| Admiralties Island | 76 | 10 | 60 | 20 |
| Langeneſs | 74 | 55 | 58 | 00 |
| Croſs Point | 72 | 25 | 58 | 12 |
| Fretum Burrough | 70 | 40 | 61 | 20 |
| Mauritius Iſle | 70 | 15 | 58 | 30 |
| Cape Candenoſe | 69 | 15 | 37 | 35 |
| Cape Barſo | 65 | 50 | 35 | 25 |

North Latitude. East Longitude.

*Sea Coaſts from* Archangel *to the* Naze *of* Norway.

| | | | | |
|---|---|---|---|---|
| Archangel | 63 | 22 | 22 | 58 |
| Fox Naze, *or* Cats Noes | 64 | 42 | 22 | 35 |
| Cape Grace, *or* Cape Bona Fortuna | 65 | 27 | 26 | 30 |
| Cape Gallant *or* Swetnoſe | 67 | 11 | 26 | 00 |
| Cape Race, *or* Black-point | 67 | 59 | 25 | 34 |
| Iſland Kilduen | 69 | 04 | 23 | 50 |
| River Cola | 69 | 05 | 23 | 50 |
| Schurtinberg Neſs | 70 | 50 | 21 | 38 |
| North Cape | 71 | 22 | 18 | 42 |
| Aſſumption | 71 | 07 | 17 | 14 |
| Zanem, *or* Sanien | 70 | 28 | 13 | 08 |
| Lowſat, *or* Loffoet | 68 | 30 | 09 | 16 |
| Werro, *or* Weroy | 67 | 38 | 08 | 28 |
| Roſs Iſles, *or* Ruſt Iſles | 67 | 01 | 08 | 06 |
| Gripo, *or* Gryp | 63 | 50 | 06 | 32 |
| Gaſtee, *or* Breeſound | 63 | 00 | 04 | 22 |
| Swinee | 62 | 40 | 03 | 46 |

North Latitude. East Longitude.

Sea

*Sea Coasts from* Archangel *to the* Naze *of* Norway.

| *Names of Places.* | Latitude. North Latitude. D. | M. | Longitude. East Longitude. D. | M. |
|---|---|---|---|---|
| Katts Ness, *or* Scutts Ness, *or* South point | 61 | 54 | 02 | 42 |
| Harla Island, *the South-end* | 60 | 04 | 03 | 38 |
| Bergen | 59 | 50 | 04 | 00 |
| Bommel Sound | 59 | 00 | 03 | 40 |
| Out Seers | 58 | 30 | 03 | 06 |
| Stafe Angor | 58 | 57 | 04 | 26 |
| Naze of Norway | 58 | 00 | 05 | 02 |
| *Sea Coasts in the* Sound. | | | | |
| Wolfe Sound | 58 | 20 | 07 | 16 |
| Maerdou | 58 | 17 | 07 | 18 |
| Long Sound | 58 | 37 | 08 | 00 |
| Laerwick | 58 | 40 | 08 | 34 |
| Coperwick | 59 | 10 | 08 | 40 |
| Ansloo | 59 | 10 | 09 | 10 |
| Noorderwick Holm | 58 | 38 | 09 | 40 |
| Pater Noster | 57 | 48 | 10 | 15 |
| Gottenberg Gat | 57 | 16 | 10 | 18 |
| Nyding, *or* Munster Gat | 57 | 15 | 10 | 30 |
| Cape Kol | 56 | 30 | 10 | 42 |
| Elsenburg | 56 | 16 | 10 | 50 |
| Scarlet Island, *or* Ween | 56 | 10 | 10 | 54 |
| South Holm | 55 | 50 | 11 | 00 |
| Valsterbore | 55 | 02 | 11 | 05 |
| De Clippen, *or* Outlyers *of* Green Island | 56 | 10 | 14 | 15 |
| Christianopoli | 56 | 30 | 14 | 15 |

*Sea Coasts in the* Sound.

| *Names of Places.* | Latitude. D. | M. | Longitude. D. | M. |
|---|---|---|---|---|
| Calmer | 56 | 45 | 14 | 44 |
| Oeland *the* *South-end* | 56 | 20 | 14 | 51 |
| Oeland *the* *Middle* | 56 | 52 | 15 | 20 |
| Oeland *the* *North-end* | 57 | 20 | 15 | 10 |
| Joffer | 57 | 17 | 15 | 10 |
| Stikholm | 57 | 33 | 14 | 35 |
| Vrouwenberg | 57 | 48 | 14 | 28 |
| Stockholm | 59 | 00 | 16 | 02 |
| Islands Boeghschaes | 59 | 49 | 18 | 49 |
| Aboo | 60 | 38 | 19 | 39 |
| Rasheburgh | 60 | 40 | 20 | 28 |
| Bogo | 60 | 52 | 23 | 10 |
| Pelting Sound | 60 | 30 | 24 | 10 |
| Vekelax | 60 | 46 | 25 | 18 |
| Wyburgh | 61 | 00 | 34 | 26 |
| Cast Rand, *or* Castrum | 60 | 02 | 32 | 47 |
| Narva | 59 | 35 | 31 | 50 |
| Revel | 59 | 28 | 27 | 18 |
| Nargin Island | 59 | 50 | 28 | 05 |
| Otoys Holm | 59 | 40 | 21 | 08 |
| Sybrichness *of* Dageroort | 59 | 34 | 20 | 31 |
| Aronsburg | 58 | 45 | 21 | 02 |
| Sorgholm | 58 | 28 | 23 | 00 |
| Parnout | 58 | 22 | 23 | 30 |
| Runen Island | 58 | 00 | 22 | 10 |
| Ryga | 57 | 10 | 22 | 50 |
| Domesness | 58 | 00 | 21 | 00 |
| Der-Winda | 57 | 28 | 19 | 43 |

North Latitude. East Longitude.

Sea

## *Sea Coaſts in the* Sound.

| *Names of Places.* | Latitude. D. | M. | Longitude D. | M. |
|---|---|---|---|---|
| er-Memel | 56 | 15 | 19 | 20 |
| oningsberg | 55 | 05 | 19 | 22 |
| antzick | 54 | 30 | 17 | 05 |
| el | 55 | 00 | 17 | 05 |
| otland, *the North-end* to Sound | 58 | 00 | 16 | 49 |
| otſche Sand | 58 | 15 | 17 | 00 |
| otland Wisbuy | 57 | 38 | 16 | 10 |
| otland, *the South-end* | 57 | 00 | 16 | 00 |
| rth Holm | 55 | 34 | 14 | 00 |
| rn Holm | 55 | 28 | 13 | 46 |
| amin | 54 | 35 | 14 | 36 |
| ſmond *on* Rugen | 55 | 00 | 13 | 20 |
| etin | 54 | 15 | 14 | 40 |
| raelſond | 54 | 30 | 12 | 50 |
| iſmor | 54 | 15 | 11 | 00 |
| beck | 54 | 10 | 09 | 56 |
| enn | 55 | 10 | 12 | 30 |
| penhagen | 55 | 50 | 11 | 54 |
| ſeneur | 56 | 15 | 11 | 57 |
| nous | 56 | 45 | 10 | 54 |
| ſon | 57 | 05 | 10 | 39 |
| he Schaw | 57 | 26 | 10 | 00 |

North Latitude. East Longitude.

*The Sea Coasts of* Holland *and* Flanders, *from* Schaw *to* Calis.

| *Names of Places.* | Latitude. D. | M. | Longitud D. | M. |
|---|---|---|---|---|
| Holy Land | 54 | 30 | 07 | 00 |
| Hambrough | 54 | 04 | 10 | 02 |
| Bremen | 53 | 50 | 09 | 02 |
| Emden | 53 | 34 | 07 | 42 |
| Ameyland | 53 | 40 | 06 | 10 |
| Schelling | 53 | 25 | 05 | 50 |
| *The* Fly | 53 | 15 | 05 | 28 |
| *The* Texel | 53 | 10 | 05 | 12 |
| Amsterdam | 52 | 40 | 05 | 17 |
| Roterdam | 52 | 05 | 05 | 00 |
| Antwerp | 51 | 37 | 04 | 52 |
| *The* Brill | 52 | 00 | 04 | 24 |
| Middleburg *in* Zealand | 51 | 48 | 03 | 50 |
| Sluys | 51 | 38 | 03 | 47 |
| Ostend | 51 | 30 | 03 | 05 |
| Dunkirk | 51 | 18 | 02 | 25 |
| Calis | 51 | 13 | 01 | 52 |

North Latitude.

*The Sea Coasts about the Island of* Iseland.

| | | | | |
|---|---|---|---|---|
| Grimes Hole | 63 | 23 | 21 | 10 |
| Gammatt Isles | 63 | 48 | 20 | 30 |
| Westmania Isles | 63 | 17 | 18 | 17 |
| Rook Point | 64 | 00 | 19 | 39 |
| Snow Hill | 65 | 11 | 20 | 14 |
| Fair Foreland | 65 | 40 | 20 | 17 |
| Rage Point | 66 | 40 | 17 | 24 |
| Varza | 67 | 08 | 15 | 06 |

North Latitude.

*The Sea Coaſts about the Iſland of* Iſeland.

| *Names of Places.* | Latitude. D. | M. | | Longitude. D. | M. | |
|---|---|---|---|---|---|---|
| mſa | 66 | 42 | North Latitude. | 14 | 44 | West Longitude. |
| ge-Neſs | 66 | 26 | | 13 | 00 | |
| gafor Point | 65 | 27 | | 12 | 25 | |
| | 64 | 50 | | 15 | 20 | |
| rn Bay | 63 | 42 | | 15 | 40 | |
| rchants Foreland | 63 | 52 | | 17 | 06 | |
| e-Neſs | 61 | 32 | | 08 | 15 | |

*The Sea Coaſts of* Scotland.

| | | | | | | |
|---|---|---|---|---|---|---|
| Iſland | 57 | 50 | North Latitude. | 06 | 21 | West Longitude. |
| d Lewes | 58 | 40 | | 07 | 12 | |
| o Head | 58 | 53 | | 04 | 05 | |
| tland | 60 | 22 | | 00 | 20 | |
| Iſle | 59 | 30 | | 00 | 30 | |
| of Orkney | 58 | 50 | | 02 | 52 | |
| h-Neſs | 58 | 47 | | 02 | 16 | |
| han-Neſs | 57 | 45 | | 00 | 28 | |
| rdeen | 57 | 12 | | 00 | 55 | |
| dee | 56 | 26 | | 02 | 07 | |
| h | 56 | 03 | | 02 | 45 | |
| wick | 55 | 59 | | 02 | 00 | |

*Coaſts of* England, *from* Berwick *to the* Lizard.

| | | | | | | |
|---|---|---|---|---|---|---|
| wcaſtle | 54 | 58 | North Latit. | 01 | 40 | West Longit. |
| lles | 55 | 02 | | 01 | 00 | |
| derland | 54 | 42 | | 01 | 08 | |
| tlepool | 54 | 37 | | 00 | 55 | |
| tby | 54 | 35 | | 00 | 40 | |
| borough | 54 | 20 | | 00 | 08 | |

## *The Coasts of* England, *from* Berwick *to the* Lizard.

| *Names of Places.* | Latitude. D. | M. | Longitu D. | M |
|---|---|---|---|---|
| Flamborough Head | 54 | 08 | 00 | 1 |
| Burlington | 54 | 00 | 00 | 06 |
| *The* Spurn | 53 | 45 | 00 | 13 |
| Hull | 53 | 45 | 00 | 28 |
| Grimesby | 53 | 39 | 00 | 56 |
| Boston | 53 | 09 | 00 | 00 |
| Linn | 52 | 50 | 00 | 20 |
| Wells | 53 | 17 | 01 | 00 |
| Blackney | 53 | 24 | 00 | 55 |
| Cromer | 53 | 20 | 01 | 17 |
| Winterton | 53 | 02 | 01 | 22 |
| Yarmouth | 52 | 55 | 01 | 28 |
| Alborough | 52 | 24 | 01 | 15 |
| Orfordneſs | 52 | 20 | 01 | 11 |
| Ipſwich | 52 | 14 | 01 | 00 |
| Harwich | 52 | 11 | 01 | 13 |
| Colcheſter | 52 | 04 | 00 | 58 |
| Tilbury Hope | 51 | 38 | 00 | 30 |
| Graveſend | 51 | 35 | 00 | 20 |
| London | 51 | 32 | 00 | 00 |
| Rocheſter | 51 | 28 | 00 | 35 |
| Quinborough | 51 | 30 | 00 | 37 |
| Marget | 51 | 29 | 01 | 10 |

North Latitude.

## *The Sea Coasts of* England.

| *Names of Places.* | Latitude. D. | M. | Longitude. D. | M. | |
|---|---|---|---|---|---|
| North Foreland | 51 | 28 | 01 | 20 | East Longitude. |
| wich | 51 | 27 | 01 | 09 | |
| Downs | 51 | 25 | 01 | 21 | |
| South Foreland | 51 | 22 | 01 | 20 | |
| raps | 51 | 13 | 01 | 25 | |
| er | 51 | 25 | 01 | 08 | |
| geneſs | 51 | 09 | 00 | 51 | |
| | 51 | 13 | 00 | 45 | |
| chy | 50 | 58 | 00 | 09 | |
| ram | 51 | 07 | 00 | 27 | |
| tſmouth | 51 | 08 | 01 | 00 | |
| of Wight | 50 | 58 | 01 | 16 | |
| ol | 51 | 04 | 01 | 50 | |
| ymouth | 51 | 03 | 02 | 40 | |
| tland | 50 | 50 | 02 | 48 | |
| ddock | 50 | 57 | 03 | 10 | |
| ne | 50 | 55 | 03 | 14 | |
| ptham | 50 | 47 | 03 | 47 | |
| Bery | 50 | 40 | 03 | 49 | |
| bay | 50 | 42 | 03 | 28 | |
| tmouth | 50 | 37 | 03 | 36 | |
| Start | 50 | 27 | 03 | 45 | |
| Edistone | 50 | 22 | 04 | 20 | |
| mouth | 50 | 36 | 04 | 13 | |
| mhead | 50 | 34 | 04 | 35 | |
| | 50 | 35 | 04 | 50 | |
| mouth | 50 | 22 | 05 | 12 | |
| ard | 50 | 05 | 05 | 24 | |

North Latitude. West Longitude.

The

*The Sea Coasts from the* Lizard *to* Holy Head.

| *Names of Places.* | Latitude. D. | M. | Longitude D. | M. |
|---|---|---|---|---|
| Lands-End | 50 | 20 | 05 | 58 |
| Gulf | 50 | 11 | 06 | 06 |
| Silly | 50 | 07 | 06 | 45 |
| Seven Stones | 50 | 18 | 06 | 40 |
| Hartland Point | 51 | 00 | 04 | 35 |
| Londey Isle | 51 | 22 | 04 | 40 |
| Holms | 51 | 27 | 03 | 40 |
| Briſtol | 51 | 32 | 02 | 40 |
| Gloceſter | 52 | 03 | 02 | 45 |
| Caldy Iſland | 51 | 43 | 05 | 14 |
| Milford | 51 | 45 | 05 | 15 |
| *St.* David's *Head* | 52 | 00 | 05 | 22 |
| Studwalls | 52 | 52 | 04 | 55 |
| Bardſey Iſle | 52 | 43 | 05 | 10 |
| Leverpole | 53 | 20 | 03 | 19 |
| Weſtcheſter | 53 | 37 | 04 | 20 |
| Iſle of Man, *Weſt-end* | 53 | 45 | 05 | 00 |
| Holy Head | 53 | 24 | 05 | 00 |

North Latitude.

*The Sea Coasts of* Ireland.

| | | | | |
|---|---|---|---|---|
| Fair Foreland | 55 | 05 | 06 | 30 |
| Iſle Torre | 55 | 00 | 08 | 30 |
| Iſles of *Arran* | 54 | 48 | 08 | 50 |
| Stags *of* Broad Haven | 54 | 07 | 10 | 05 |
| Iſles *of* Arian | 53 | 00 | 09 | 50 |
| Galloway | 53 | 05 | 09 | 20 |
| Gally, *or* Doen's Head | 52 | 40 | 09 | 30 |
| Lupis's Head | 52 | 24 | 10 | 15 |

North Latitude.

*The Sea Coasts of* Ireland.

| *Names of Places.* | Latitude. North Latitude. D. | M. | Longitude. West Longitude. D. | M. |
|---|---|---|---|---|
| rick | 52 | 34 | 09 | 00 |
| ques | 52 | 00 | 10 | 55 |
| ocks | 51 | 30 | 10 | 35 |
| and Calf | 51 | 22 | 10 | 36 |
| an Head | 51 | 15 | 10 | 00 |
| Head | 51 | 25 | 08 | 48 |
| Clear | 51 | 10 | 09 | 40 |
| fale | 51 | 50 | 08 | 40 |
| k | 51 | 50 | 08 | 35 |
| erford | 52 | 10 | 07 | 38 |
| ford | 52 | 23 | 06 | 38 |
| lin | 53 | 22 | 06 | 30 |
| bay | 53 | 24 | 06 | 30 |

*The Sea Coasts of* France.

| | | | | |
|---|---|---|---|---|
| | 51 | 03 | 01 | 52 |
| | 50 | 05 | 01 | 15 |
| Valery | 50 | 00 | 00 | 56 |
| Head | 49 | 44 | 00 | 04 |
| | 49 | 36 | 00 | 30 |
| Barfleur | 49 | 47 | 01 | 32 |
| de Hague | 49 | 50 | 02 | 30 |
| rney | 49 | 52 | 01 | 47 |
| ets | 50 | 00 | 02 | 15 |
| | 49 | 40 | 02 | 19 |
| ley | 49 | 36 | 02 | 35 |
| | 49 | 32 | 02 | 15 |

North Latitude. East Longit. West Longit.

The

## *The Sea Coasts of* France.

| *Names of Places.* | Latitude. D. | M. | Longitude. D. | M. |
|---|---|---|---|---|
| Jersey | 49 | 20 | 02 | 00 |
| Buskin | 49 | 19 | 01 | 42 |
| Chosoe | 49 | 05 | 01 | 40 |
| *St.* Maloes | 48 | 45 | 01 | 45 |
| Susse Isles | 49 | 00 | 03 | 22 |
| Morlaix | 48 | 54 | 03 | 45 |
| Island de Bass | 49 | 00 | 03 | 57 |
| Ushant | 48 | 35 | 05 | 19 |
| Conquet | 48 | 45 | 05 | 05 |
| Brest | 48 | 25 | 04 | 25 |
| Camarita Bay | 48 | 25 | 04 | 28 |
| Seams | 48 | 04 | 05 | 01 |
| Parker | 48 | 00 | 05 | 25 |
| West Penmarks | 47 | 35 | 04 | 14 |
| Glanants | 47 | 33 | 03 | 50 |
| Groy | 47 | 35 | 03 | 30 |
| Bell Isle | 47 | 19 | 03 | 10 |
| Cardinals | 47 | 27 | 03 | 00 |
| Ronche Bernard | 47 | 25 | 01 | 51 |
| Nants | 47 | 45 | 01 | 09 |
| Picquelier Isle | 47 | 00 | 02 | 02 |
| Heys Isle | 46 | 34 | 02 | 04 |
| Baerse | 46 | 30 | 01 | 30 |
| *St.* Martins | 46 | 16 | 00 | 55 |
| Oleron *on the* Main | 46 | 20 | 00 | 54 |
| Mamosin | 45 | 49 | 00 | 50 |
| Toppar | 45 | 36 | 01 | 55 |

North Latitude.

*the Sea Coasts of* France, Spain, *and* Portugal.

| *Names of Places.* | Latitude. D. | M. | | Longitude. D. | M. | |
|---|---|---|---|---|---|---|
| chel | 46 | 00 | North Latitude. | 00 | 30 | W. L. |
| rant | 46 | 00 | | 00 | 28 | |
| y | 45 | 28 | | 00 | 5 | |
| rdeaux City | 45 | 10 | | 00 | 20 | E. L. |
| Sebastian | 43 | 40 | | 01 | 05 | West Longitude. |
| boa | 43 | 41 | | 02 | 04 | |
| Andero | 43 | 43 | | 02 | 48 | |
| ons | 43 | 49 | | 03 | 18 | |
| pe Pinas | 44 | 04 | | 04 | 32 | |
| pe Ortegal | 44 | 08 | | 05 | 30 | |
| larga | 43 | 38 | | 07 | 16 | |
| pe Coriana | 43 | 21 | | 08 | 20 | |
| pe Finisterre | 43 | 10 | | 08 | 20 | |
| *of* Bajona | 42 | 22 | | 07 | 24 | |
| lings | 39 | 43 | | 07 | 52 | |
| k *of* Lisbon | 39 | 00 | | 07 | 28 | |
| bon | 39 | 08 | | 06 | 30 | |
| pe *St.* Vincent | 37 | 00 | | 08 | 25 | |
| pe *St.* Maria | 36 | 52 | | 05 | 48 | |
| diz | 36 | 32 | | 05 | 05 | |

*Coasts on the Main Continent within the* Straits.

| | | | | | | |
|---|---|---|---|---|---|---|
| ralter | 36 | 40 | North Lat. | 03 | 18 | W. L. |
| laga | 36 | 45 | | 02 | 17 | |
| s Malaga | 36 | 49 | | 01 | 51 | |
| pe de Gat | 36 | 47 | | 00 | 08 | E. L. |

*Sea Coaſts on the Main Continent within the* Straits.

| *Names of Places.* | Latitude. D. | M. | Longitude D. | M. |
|---|---|---|---|---|
| Cape Paul | 37 | 28 | 01 | 47 |
| Alicant | 38 | 20 | 01 | 50 |
| Cape Martin | 38 | 46 | 02 | 56 |
| Cape Pallamallo | 40 | 10 | 03 | 15 |
| Cape Dagofrito | 41 | 41 | 05 | 54 |
| Marſelia | 43 | 12 | 07 | 20 |
| Tallone | 43 | 00 | 08 | 40 |
| Cape Larei | 42 | 58 | 09 | 14 |
| Cape Melle | 43 | 51 | 10 | 13 |
| Legorn | 43 | 28 | 13 | 39 |
| Civita Vechia | 41 | 46 | 15 | 00 |
| Rome | 41 | 50 | 15 | 45 |
| Naples | 41 | 08 | 17 | 27 |
| Sellerno | 40 | 51 | 18 | 08 |
| Pollicaſtro | 40 | 08 | 18 | 38 |
| Cape Spartaventa | 37 | 46 | 18 | 52 |
| Cape Collam | 38 | 50 | 20 | 16 |
| Gallippoli | 40 | 08 | 21 | 40 |
| Cape *St.* Maria | 39 | 52 | 22 | 29 |
| Angelo | 41 | 31 | 21 | 38 |
| Ancona | 43 | 25 | 19 | 05 |
| Gorro | 44 | 57 | 16 | 11 |
| Venetia | 45 | 37 | 17 | 21 |
| Cape Eſtria | 44 | 40 | 18 | 46 |
| Sagua | 44 | 47 | 20 | 25 |
| Zaro | 44 | 05 | 21 | 15 |
| Salconico | 44 | 01 | 22 | 00 |

North Latitude.

*Sea Coaſts on the Main Continent within the* Straits.

| *Names of Places.* | Latitude. North Latitude. D. | M. | Longitude. East Longitude. D. | M. |
|---|---|---|---|---|
| Cape Caſta | 43 | 27 | 21 | 24 |
| Trovor | 43 | 30 | 22 | 13 |
| Stanio | 42 | 57 | 22 | 47 |
| Ragusſa | 42 | 29 | 23 | 33 |
| Cattaro | 42 | 21 | 24 | 23 |
| Antavara | 41 | 49 | 25 | 30 |
| Diraſſa | 40 | 57 | 25 | 14 |
| Cape Linga | 40 | 19 | 24 | 14 |
| Drugomaſtra | 38 | 38 | 25 | 16 |
| Caſtelternis | 37 | 45 | 25 | 08 |
| Cape Matapan | 36 | 28 | 25 | 29 |
| Cape Sille | 37 | 15 | 26 | 28 |
| Cape Colloni | 37 | 40 | 27 | 11 |
| Cape *St.* George | 39 | 28 | 26 | 46 |
| Cape Pimra | 40 | 26 | 26 | 59 |
| Cape Degriffa | 40 | 12 | 31 | 47 |
| Gallippoli | 40 | 20 | 32 | 35 |
| Conſtantinople | 40 | 56 | 35 | 09 |
| Nicomeda | 40 | 26 | 35 | 15 |
| Land Miri | 39 | 12 | 31 | 41 |
| Cape Babarnou | 37 | 58 | 30 | 58 |
| Cape Coxman | 36 | 16 | 31 | 20 |
| Cape Siridoni | 35 | 35 | 36 | 00 |
| Cape Pollipoli | 35 | 35 | 38 | 37 |
| Antiochia | 34 | 54 | 41 | 00 |
| Zidon | 34 | 10 | 41 | 30 |
| Joppa | 32 | 42 | 39 | 35 |
| Cairo | 30 | 35 | 35 | 20 |

*Sea Coaſts on the Main Continent within the* Straits.

| *Names of Places.* | Latitude. D. | M. | Longitude. D. | M. |
|---|---|---|---|---|
| Alexandria | 30 | 40 | 35 | 04 |
| Cape Raſauſen | 32 | 18 | 25 | 40 |
| Cape Riſſuta | 32 | 58 | 24 | 02 |
| Cape de Solli | 31 | 01 | 20 | 25 |
| Cape Mizorrata | 32 | 18 | 18 | 36 |
| Chercana | 34 | 56 | 13 | 12 |
| Britto | 35 | 23 | 13 | 17 |
| Suſſa | 36 | 02 | 12 | 43 |
| Cape Bona | 37 | 05 | 12 | 47 |
| Tunis | 36 | 50 | 12 | 00 |
| Bozorat | 37 | 30 | 12 | 26 |
| Bona | 37 | 19 | 11 | 20 |
| Stora | 37 | 09 | 10 | 20 |
| Collo | 37 | 09 | 09 | 50 |
| Gigaria | 37 | 03 | 09 | 02 |
| Gion | 36 | 50 | 08 | 06 |
| Ragin | 36 | 50 | 06 | 20 |
| Tadellis | 36 | 48 | 05 | 00 |
| Algier | 36 | 40 | 04 | 30 |
| Sally | 36 | 40 | 04 | 24 |
| Tenez | 36 | 30 | 02 | 54 |
| Oran | 35 | 46 | 01 | 35 |
| Bellis | 34 | 57 | 01 | 36 |
| Wadallo | 34 | 57 | 02 | 11 |
| Tangier | 35 | 36 | 03 | 19 |

North Latitude. East Longitude.

Iſla

## *Iſlands within the* Straits.

| *Names of Iſlands.* | Latitude. D. | M. | Longitude. D. | M. |
|---|---|---|---|---|
| Formentara | 38 | 44 | 04 | 30 |
| Ivica | 39 | 05 | 04 | 33 |
| Collombitta | 39 | 50 | 03 | 20 |
| Cabrera | 39 | 07 | 05 | 41 |
| Majorca | 39 | 38 | 05 | 48 |
| Minorca | 39 | 55 | 06 | 52 |
| Gallatta | 37 | 57 | 11 | 04 |
| Serpentera | 39 | 00 | 11 | 54 |
| South-End *of* Sardinia | 38 | 56 | 11 | 13 |
| North-End *of* Sardinia | 41 | 10 | 12 | 01 |
| Azennera | 41 | 08 | 10 | 58 |
| South-End *of* Corſica | 41 | 20 | 11 | 37 |
| North-end *of* Corſica | 42 | 55 | 12 | 02 |
| Caprera | 42 | 58 | 12 | 57 |
| Libo | 42 | 31 | 13 | 12 |
| Planoſa | 42 | 07 | 13 | 09 |
| M. Chriſto | 41 | 55 | 13 | 27 |
| Palmarolla | 40 | 50 | 14 | 35 |
| Ponſſa | 40 | 40 | 15 | 08 |
| Iſcia | 40 | 46 | 16 | 12 |
| Strombello | 39 | 03 | 17 | 38 |
| Volcanello | 38 | 48 | 17 | 06 |
| Pellicur | 38 | 43 | 16 | 37 |
| Allicur | 38 | 45 | 16 | 23 |
| Iſtica | 38 | 50 | 15 | 34 |
| Weſt-End *of* Sicilia | 37 | 52 | 14 | 43 |
| Middle *of* Sicilia | 37 | 42 | 16 | 45 |
| Eaſt-End *of* Sicilia | 37 | 07 | 18 | 00 |

North Latitude. East Longitude.

*Iſlands within the* Straits.

| *Names of Iſlands.* | Latitude. North Latitude. D. | M. | Longitude. East Longitude. D. | M. |
|---|---|---|---|---|
| Meſſina | 38 | 07 | 17 | 57 |
| Zambra | 37 | 10 | 13 | 10 |
| Pantalaria | 36 | 53 | 14 | 11 |
| Linoſſa | 36 | 20 | 14 | 41 |
| Lampadoſa | 35 | 58 | 14 | 35 |
| Sematto | 35 | 46 | 14 | 15 |
| Gazo | 36 | 15 | 15 | 27 |
| Comino | 36 | 15 | 16 | 00 |
| Malta | 36 | 00 | 16 | 30 |
| Iſland Grozo | 44 | 00 | 20 | 12 |
| Poma | 43 | 14 | 20 | 24 |
| *St.* Andrea | 43 | 07 | 20 | 34 |
| Buze | 43 | 02 | 20 | 54 |
| Liſſa | 43 | 00 | 21 | 09 |
| Catſſo | 42 | 44 | 21 | 34 |
| Agoſta | 42 | 36 | 21 | 59 |
| Corſella | 42 | 53 | 22 | 14 |
| Mellida | 42 | 37 | 22 | 39 |
| Farmo | 39 | 44 | 23 | 55 |
| Corfu | 39 | 25 | 24 | 02 |
| Cape Sidro | 38 | 15 | 24 | 09 |
| Zante | 37 | 37 | 24 | 14 |
| Sapentia | 36 | 47 | 24 | 52 |

*Iſlands in the* Archipelago.

| | | | | |
|---|---|---|---|---|
| Taſſo | 40 | 00 North. | 29 | 55 East. |
| Lemnos | 39 | 41 | 30 | 25 |
| Mettalin | 38 | 54 | 39 | 28 |



*Iſland*

*Iſlands in the* Archipelago.

| *Names of Iſlands.* | Latitude. D. | M. | Longitude. D. | M. |
|---|---|---|---|---|
| Ipſera | 38 | 28 | 29 | 57 |
| Schyro | 39 | 00 | 28 | 45 |
| Scatto | 39 | 42 | 27 | 27 |
| Scopollo | 39 | 23 | 27 | 53 |
| Hilladromo | 39 | 34 | 28 | 02 |
| Largor | 39 | 47 | 28 | 31 |
| Tino | 37 | 55 | 28 | 49 |
| Sia | 37 | 38 | 28 | 27 |
| Femenia | 37 | 28 | 27 | 54 |
| Serfanto | 36 | 58 | 28 | 15 |
| Millo | 36 | 40 | 27 | 45 |
| Levallo | 36 | 38 | 29 | 30 |
| Stampalia | 36 | 11 | 29 | 35 |
| Weſt-end *of* Candia | 35 | 15 | 27 | 01 |
| Middle *of* Candia | 35 | 08 | 28 | 32 |
| Eaſt-end *of* Candia | 35 | 04 | 30 | 08 |
| Rhodes | 35 | 40 | 31 | 58 |
| Weſt-end *of* Cyprus | 34 | 22 | 36 | 23 |
| Middle *of* Cyprus | 34 | 18 | 37 | 45 |
| Eaſt-end *of* Cyprus | 34 | 48 | 38 | 54 |

North Latitude. East Longitude.

*The Sea Coaſts of* Barbary *and* Guinny, *from* Tangier *to* Sampſon's *River.*

| | | | | |
|---|---|---|---|---|
| Tangier | 35 | 36 | 03 | 35 |
| Cape Cantin | 32 | 27 | 06 | 30 |
| Cape de Geer | 30 | 30 | 06 | 50 |
| Cape Gilon | 29 | 50 | 06 | 53 |
| Cape de Non | 28 | 52 | 07 | 10 |

North Lat. Weſt Long.

*The Sea Coaſts of* Barbary *and* Guinny, *from* Tangier *to* Sampſon's *River.*

| *Names of Places.* | Latitude. D. | M | | Longitude. D. | M. | |
|---|---|---|---|---|---|---|
| Marpeiueno | 27 | 22 | | 07 | 35 | West Longitude. |
| Cape Borador | 26 | 55 | | 08 | 16 | |
| Cape Blanco | 20 | 30 | | 14 | 50 | |
| Cape de Verd | 14 | 30 | | 17 | 45 | |
| River *of* Gamboa | 12 | 47 | | 07 | 41 | |
| Cape Roxo | 11 | 38 | | 13 | 37 | |
| Cape de Monte | 05 | 23 | North Latitude. | 10 | 05 | |
| River de Caſto | 05 | 20 | | 01 | 36 | |
| Cape de Palmas | 04 | 00 | | 01 | 01 | |
| River *St.* Andrea | 05 | 23 | | 02 | 42 | |
| Cape Corce | 05 | 00 | | 04 | 00 | East Longitude. |
| Cape Three Points | 04 | 10 | | 07 | 36 | |
| River de Valta, *or* Acara | 06 | 05 | | 11 | 28 | |
| River de Lagos, *or* Arda | 07 | 40 | | 14 | 25 | |
| River Benin | 06 | 53 | | 16 | 48 | |
| Cape Formoſa | 04 | 03 | | 17 | 28 | |
| New Callabar | 04 | 40 | | 18 | 13 | |
| Old Callabar | 04 | 50 | | 19 | 51 | |
| Sampſon's River | 04 | 22 | | 20 | 28 | |

*Sea Coaſts from* Guinny *to* Cape Bon Eſperance.

| | | | | | | |
|---|---|---|---|---|---|---|
| River de Gamarones | 04 | 00 | | 21 | 45 | |
| River Borro | 02 | 42 | North. | 22 | 05 | East. |
| Iſland Fernandepo | 03 | 10 | | 20 | 42 | |
| Iſland de Principe | 01 | 50 | | 19 | 50 | |
| River de Anger | 01 | 00 | | 22 | 06 | |
| River Gabon | 00 | 10 | | 12 | 52 | |

Sea

*Sea Coaſts from* Guinny *to* Cape Bon Eſperance.

| *Names of Places.* | Latitude. D. | M. | | Longitude. D. | M. | |
|---|---|---|---|---|---|---|
| Iland Chocos | 00 | 40 | N. L. | 18 | 26 | |
| Iland *St.* Thome | 00 | 10 | | 18 | 10 | |
| Iland *St.* Matheos | 01 | 40 | | 02 | 21 | East Longitude. |
| Iland Aſcenſion | | | | | | |
| Iland Anabona | 01 | 22 | | 17 | 32 | |
| Cape Lopas | 01 | 00 | | 20 | 07 | |
| Cape Padro | 06 | 00 | | 23 | 40 | |
| Cape Ledo | 10 | 00 | South Latitude. | 23 | 59 | |
| Cape Negro | 16 | 30 | | 22 | 11 | |
| Iſſas | 17 | 45 | | 17 | 34 | |
| S. Hellena Nova | 16 | 03 | | 14 | 24 | |
| S. Hellena | 16 | 03 | | 05 | 30 | W. |
| Cape Secos | 29 | 40 | | 24 | 50 | East Long. |
| Cape Bon Eſperance | 34 | 25 | | 27 | 30 | |
| Cape Anguiſias | 36 | 20 | | 28 | 30 | |
| Iland Garlaice | 37 | 56 | | 06 | 40 | |
| Iland Triſtian | 36 | 57 | | 06 | 10 | |
| *The Sea Coaſts of* Brazilie. | | | | | | |
| River de Plata | 35 | 50 | | 44 | 50 | West Longitude. |
| Cape *St.* Maria | 35 | 00 | South Latitude. | 42 | 35 | |
| Cape Frio | 22 | 52 | | 30 | 07 | |
| Cape *St* Thome | 21 | 47 | | 29 | 02 | |
| Iland de Picos | 21 | 52 | | 11 | 15 | |
| Iland de Martin | 19 | 00 | | 13 | 27 | |
| S. Maria de Agoſta | 19 | 38 | | 18 | 08 | |
| Trinidada | 19 | 50 | | 19 | 48 | |

The

*The Sea Coaſts of* Brazilia.

| *Names of Places.* | Latitude. D. | M. | | Longitude D. | M. |
|---|---|---|---|---|---|
| Iſland Aſcenſion | 19 | 19 | | 22 | 25 |
| *St.* Harbara | 18 | 11 | | 26 | 30 |
| Cape de Abiolho | 17 | 52 | | 27 | 06 |
| River Grande | 14 | 49 | South Latitude. | 27 | 30 |
| River Real | 11 | 21 | | 26 | 05 |
| River *St.* Miguel | 09 | 30 | | 24 | 35 |
| Cape *St.* Auguſtine | 08 | 25 | | 28 | 32 |
| Cape *St.* Raphael | 06 | 10 | | 25 | 00 |
| Abrotho | 05 | 00 | | 23 | 20 |
| Iſland Farnando | 03 | 40 | | 25 | 00 |
| Rocas | 03 | 42 | | 22 | 40 |
| Cape Blanco | 02 | 25 | | 27 | 53 |
| Iſland Aſcenſion | 07 | 48 | | 05 | 30 |
| Iſland *St.* Paul | 00 | 55 | N. | 25 | 00 |

*The Sea Coaſts on the Main Continent in the* Eaſt-Indies.

| | | | | | |
|---|---|---|---|---|---|
| Bay de Allagoa | 33 | 18 | | 38 | 35 |
| River *St.* Lucia | 28 | 25 | South Latitude. | 40 | 45 |
| Cape *St.* Martin | 25 | 40 | | 41 | 35 |
| Cape Corientes | 23 | 30 | | 43 | 27 |
| I. de Aguada | 15 | 17 | | 48 | 02 |
| Cape Falco | 08 | 02 | | 47 | 00 |
| Tangoa | 05 | 20 | | 46 | 37 |
| Molinde | 02 | 42 | | 46 | 47 |
| River de Lamo | 01 | 29 | | 46 | 53 |
| Magadoxo | 02 | 30 | Nor. | 54 | 00 |
| Cape de Baſſos | 04 | 30 | | 59 | 55 |

*...a Coaſts in the Main Continent in the* East-Indies.

| *Names of Places.* | Latitude. D. | M. | Longitude. D. | M. |
|---|---|---|---|---|
| ...pe de Guardeſin | 11 | 40 | 66 | 00 |
| ...den | 13 | 08 | 61 | 32 |
| ...pe de Matriaca | 15 | 33 | 67 | 15 |
| ...far | 17 | 00 | 69 | 40 |
| ...pe Duas Pointas | 18 | 19 | 73 | 45 |
| ...pe Raſolgate | 22 | 07 | 79 | 15 |
| ...pe Mozando | 25 | 32 | 77 | 15 |
| ...do | 24 | 50 | 84 | 04 |
| ...ver de Sinda | 24 | 55 | 90 | 15 |
| ...o | 20 | 48 | 91 | 03 |
| ...rat | 21 | 00 | 94 | 12 |
| ...man | 19 | 54 | 93 | 37 |
| ...haul | 18 | 10 | 93 | 27 |
| ...abul | 17 | 01 | 93 | 31 |
| ...oa | 14 | 40 | 91 | 37 |
| ...ngualar | 12 | 40 | 91 | 55 |
| ...allant | 10 | 48 | 92 | 03 |
| ...ochin | 09 | 40 | 92 | 05 |
| ...pe Comorin | 07 | 50 | 92 | 15 |
| ...ga Patam | 11 | 21 | 94 | 35 |
| ...rmegon | 14 | 35 | 95 | 03 |
| ...mbron | 18 | 30 | 103 | 28 |
| ...copoir | 20 | 19 | 107 | 15 |
| ...ver Bengal | 22 | 09 | 116 | 09 |
| ...ver de Caera | 10 | 45 | 113 | 30 |
| ...uada | 06 | 47 | 112 | 90 |
| ...allacca | 01 | 41 | 110 | 50 |

North Latitude. East Longitude.

and

*Iſlands in the* East Indies.

| *Names of Iſlands.* | Latitude. D. | M. | Longitude D. | M. |
|---|---|---|---|---|
| Romeyros | 28 | 19 | 73 | 57 |
| John de Lisbon | 25 | 24 | 63 | 08 |
| Diego Roys | 20 | 05 | 69 | 30 |
| *St.* Brandon | 17 | 13 | 69 | 20 |
| Mauritius | 20 | 10 | 63 | 20 |
| Don Maſcharinnas | 20 | 50 | 61 | 30 |
| *St.* Apollonia | 20 | 50 | 60 | 30 |
| South-end *of St.* Laurence | 25 | 37 | 55 | 30 |
| Middle *of St.* Laurence | 18 | 30 | 51 | 05 |
| N. end *of St.* Laurence | 11 | 03 | 58 | 25 |
| John de Nova | 17 | 20 | 50 | 05 |
| *St.* Chriſtopher | 14 | 30 | 50 | 39 |
| Mayotta | 12 | 40 | 52 | 31 |
| Joanna | 12 | 09 | 51 | 39 |
| Mohilla | 12 | 11 | 51 | 01 |
| Comaro | 11 | 20 | 50 | 24 |
| Manſia | 07 | 50 | 47 | 44 |
| Zanzibar | 06 | 25 | 48 | 11 |
| Pemba | 05 | 09 | 48 | 06 |
| John de Comaro | 09 | 00 | 51 | 56 |
| Coſmoledo | 09 | 40 | 56 | 28 |
| John de Novo | 09 | 00 | 58 | 02 |
| Aſtores Ilheos | 09 | 05 | 59 | 38 |
| Agalega | 09 | 00 | 60 | 51 |
| De Almicanta | 03 | 57 | 58 | 04 |
| Iſland Quehallo | 03 | 40 | 58 | 56 |
| *St.* Hermanos | 03 | 02 | 65 | 01 |
| Diego Gratioſa | 08 | 03 | 72 | 51 |
| Pedros Blanco | 06 | 10 | 71 | 31 |

South Latitude. East Longitude.

Iſlan

## *Islands in the* East-Indies.

| *Names of Islands.* | Latitude. D. | M. | | Longitude. D. | M. | |
|---|---|---|---|---|---|---|
| ocotora | 12 | 18 | North Latitude. | 68 | 37 | East Longitude. |
| land de Zocha | 11 | 22 | | 85 | 21 | |
| ubolla | 08 | 53 | | 85 | 43 | |
| olaque | 09 | 05 | | 86 | 05 | |
| aripa | 10 | 50 | | 85 | 32 | |
| ualpena | 10 | 32 | | 86 | 34 | |
| ndomaon | 11 | 30 | | 85 | 27 | |
| eylon | 07 | 50 | | 93 | 15 | |
| land Cocos | 14 | 30 | | 109 | 48 | |
| land d'Andemaio | 13 | 00 | | 109 | 15 | |
| uarinibar | 11 | 10 | | 109 | 20 | |
| land Rase | 09 | 52 | | 109 | 09 | |
| land de Sombrese | 08 | 00 | | 109 | 20 | |
| icobars | 07 | 00 | | 109 | 40 | |
| orth-End *of* Sumatra | 05 | 28 | | 111 | 15 | |
| iddle *of* Sumatra | 01 | 30 | South Lat. | 115 | 25 | |
| outh-End *of* Sumatra | 05 | 52 | | 120 | 24 | |
| mbe | 01 | 49 | | 117 | 01 | |
| antam | 06 | 15 | | 110 | 10 | |

## *The Southern Islands.*

| | | | | | | |
|---|---|---|---|---|---|---|
| . Antonio | 17 | 07 | North Latitude. | 26 | 40 | West Longit. |
| . Vincent | 16 | 55 | | 25 | 56 | |
| . Lucia | 16 | 50 | | 25 | 32 | |
| Nicholas | 16 | 30 | | 24 | 48 | |
| de Sall | 17 | 00 | | 22 | 30 | |
| onavista | 15 | 58 | | 22 | 23 | |

*The*

*The Southern Iſlands.*

| *Names of Iſlands.* | Latitude. D. | M. | | Longitud D. | M. |
|---|---|---|---|---|---|
| Mayo | 15 | 00 | North Latitude. | 23 | 06 |
| *St.* Jago | 14 | 52 | | 24 | 06 |
| Fuogo | 14 | 42 | | 25 | 20 |
| Brava | 14 | 49 | | 25 | 38 |
| Vegie | 12 | 26 | | 29 | 12 |
| Vegie | 11 | 12 | | 31 | 30 |
| *St.* Paul | 01 | 32 | | 25 | 20 |
| Abrotheos | 00 | 00 | | 26 | 00 |
| *The* Canary *Iſlands.* | | | | | |
| Porto Sancto | 33 | 14 | North Latitude. | 16 | 49 |
| Madera | 32 | 27 | | 18 | 10 |
| Dezartes | 32 | 08 | | 17 | 50 |
| Salvages | 30 | 05 | | 17 | 30 |
| Palma | 28 | 58 | | 19 | 06 |
| Ferro | 28 | 05 | | 20 | 07 |
| Gomera | 28 | 09 | | 19 | 00 |
| Tenariff | 28 | 20 | | 17 | 30 |
| Grand Canaria | 27 | 43 | | 16 | 35 |
| Allegranſa | 29 | 11 | | 14 | 07 |
| Lancerotta | 28 | 51 | | 14 | 12 |
| Forteventura | 28 | 12 | | 14 | 51 |
| *The Weſtern Iſlands.* | | | | | |
| Abraojo | 38 | 55 | North. | 25 | 40 |
| Vegie | 40 | 30 | | 25 | 42 |
| Corvo | 40 | 09 | | 32 | 23 |
| Flores | 39 | 30 | | 32 | 19 |

## The Western Islands.

| Names of Islands. | Latitude. North Latitude. D. | M. | Longitude. West Longitude. D. | M. |
|---|---|---|---|---|
| ial | 38 | 49 | 35 | 37 |
| ico | 38 | 30 | 29 | 00 |
| . George | 39 | 00 | 28 | 44 |
| ercera | 39 | 31 | 27 | 46 |
| ratiosa | 39 | 30 | 28 | 15 |
| brajo | 39 | 52 | 24 | 17 |
| ajo | 38 | 43 | 23 | 47 |
| . Michael | 38 | 00 | 25 | 40 |
| ormigas | 37 | 25 | 24 | 00 |
| . Maria | 37 | 00 | 24 | 20 |
| egie | 42 | 22 | 24 | 20 |
| land Verda | 44 | 48 | 28 | 50 |
| laiden Island | 46 | 30 | 20 | 00 |
| Old Brazeel | 51 | 03 | 16 | 50 |

## The Sea Coasts of Hudson's Bay, Newfoundland, and New-England.

| | | | | |
|---|---|---|---|---|
| Cape Farewell | 60 | 00 | 48 | 50 |
| land Resolution | 61 | 30 | 68 | 30 |
| ort Nelson | 57 | 10 | 96 | 20 |
| . Henerita Maria | 55 | 00 | 87 | 12 |
| Charlton Island | 52 | 10 | 83 | 00 |
| Rupert's River | 51 | 32 | 83 | 15 |
| roy | 51 | 10 | 54 | 10 |
| ell Isle | 51 | 03 | 44 | 08 |
| enguin Island | 50 | 02 | 52 | 46 |
| ape Bonavista | 49 | 19 | 53 | 06 |

The

## *The Sea Coaſts of* Hudſon's Bay, Newfoundland, *and* New-England.

| *Names of Places.* | Latitude. D. | M. | Longitude D. | M. |
|---|---|---|---|---|
| Trinity Bay | 48 | 55 | 54 | 28 |
| Bacalao | 48 | 39 | 52 | 19 |
| Conception Bay | 48 | 20 | 53 | 13 |
| Cape *St.* Francis | 47 | 44 | 52 | 51 |
| Cape Deſpair | 47 | 22 | 51 | 27 |
| Ferryland Head | 46 | 50 | 51 | 27 |
| Cape Race | 46 | 28 | 51 | 54 |
| Bay *of* Bulls | 47 | 27 | 52 | 35 |
| *St.* John's Harbour | 47 | 48 | 52 | 45 |
| Placentia Bay | 47 | 33 | 53 | 05 |
| Cape *St.* Larinſo | 37 | 09 | 54 | 23 |
| Iſland *St.* Paul | 37 | 37 | 55 | 42 |
| Cape Roy | 48 | 05 | 58 | 13 |
| Cape d'Games | 54 | 00 | 58 | 45 |
| Cape *St.* Charles | 52 | 47 | 57 | 47 |
| Cape Britain | 46 | 00 | 58 | 21 |
| Cape Sable | 43 | 45 | 63 | 30 |
| Cape Codd | 42 | 10 | 68 | 30 |
| Boſton | 42 | 38 | 70 | 00 |
| Plimouth | 42 | 08 | 68 | 01 |
| Nantuckett | 41 | 09 | 65 | 41 |
| Martin's Vineyard | 41 | 18 | 66 | 36 |

North Latitude.

## *The Sea Coaſts on the Main Continent in the* Weſt-Indies.

| *Names of Places.* | Latitude. North Latitude. D. | M. | Longitude. Weſt Longitude. D. | M. |
|---|---|---|---|---|
| Elizabeth's Iſland | 41 | 03 | 67 | 30 |
| Block Iſland | 40 | 55 | 68 | 00 |
| Long Iſland | 40 | 45 | 68 | 40 |
| Cape May | 39 | 55 | 70 | 09 |
| Cape Charles | 37 | 48 | 73 | 15 |
| Cape Henry | 37 | 00 | 74 | 02 |
| Cape Hattaras | 35 | 50 | 73 | 10 |
| Cape Feare | 34 | 02 | 75 | 20 |
| Cape Carnavaral | 28 | 40 | 79 | 15 |
| Cape Florida | 24 | 46 | 80 | 00 |
| Laphillipina | 30 | 17 | 84 | 28 |
| Cape de Catocha | 21 | 23 | 86 | 01 |
| Cape de Camaron | 16 | 05 | 81 | 43 |
| Cape de Gratias | 15 | 32 | 76 | 20 |
| Cartagena | 10 | 25 | 70 | 30 |
| Bay Fonto | 12 | 10 | 68 | 00 |
| Cape Roman | 11 | 55 | 66 | 00 |
| Cape Codera | 11 | 08 | 62 | 02 |
| Cape Three Points | 11 | 18 | 61 | 05 |
| Cape Breme | 09 | 20 | 59 | 40 |
| Cape Dasbaſſas | 08 | 20 | 58 | 35 |
| Suramo | 06 | 10 | 56 | 20 |
| Suranam | 05 | 55 | 55 | 16 |

## Iſlands in the West Indies.

| Names of Iſlands. | Latitude. North Latitude. D. | M. | Longitude. West Longitude. D. | M. |
|---|---|---|---|---|
| Iſland Fonſeca | 12 | 24 | 53 | 54 |
| La Barmudos | 32 | 25 | 63 | 30 |
| Behama | 27 | 57 | 78 | 30 |
| Teavis | 27 | 27 | 76 | 28 |
| Siguatro | 26 | 18 | 74 | 09 |
| Guarao | 25 | 47 | 73 | 24 |
| Guanima | 25 | 15 | 73 | 17 |
| Triangulo | 24 | 33 | 71 | 54 |
| Guanahimo | 23 | 50 | 72 | 03 |
| Mayaguana | 23 | 05 | 72 | 15 |
| Cacos | 22 | 05 | 69 | 55 |
| Amiana | 21 | 40 | 70 | 02 |
| Nagua | 21 | 19 | 72 | 27 |
| Yamatta | 22 | 32 | 73 | 13 |
| Samane | 24 | 20 | 74 | 14 |
| Yamia | 24 | 22 | 75 | 34 |
| Jabaqua | 25 | 10 | 76 | 54 |
| *St.* John | 18 | 30 | 66 | 06 |
| *St.* Cruſe | 17 | 42 | 64 | 42 |
| Anguilla | 18 | 48 | 62 | 24 |
| *St.* Martin | 18 | 35 | 62 | 11 |
| *St.* Bartholomew | 18 | 15 | 61 | 57 |
| Barbada | 17 | 18 | 61 | 03 |
| Antego | 16 | 32 | 60 | 16 |
| Deſſeda | 16 | 00 | 60 | 00 |
| Marigallanta | 15 | 41 | 60 | 50 |
| Dominica | 15 | 00 | 60 | 29 |
| Martineco | 14 | 20 | 60 | 08 |

## *Iſlands in the* Weſt Indies.

| *Names of Iſlands.* | Latitude. North Latitude. D. | M. | Longitude. West Longitude. D. | M. |
|---|---|---|---|---|
| *St.* Lucia | 13 | 30 | 60 | 07 |
| Barbadoes | 13 | 10 | 57 | 24 |
| Tobago | 11 | 12 | 58 | 30 |
| Point de Gallera | 10 | 45 | 58 | 55 |
| Granada | 12 | 10 | 59 | 56 |
| *St.* Vincent | 12 | 50 | [illegible] | 52 |
| Guardalupa | 16 | 00 | 60 | 55 |
| Monſerat | 16 | 20 | 61 | 05 |
| Mevis | 17 | 00 | 61 | 51 |
| *St.* Chriſtopher | 17 | 30 | 62 | 09 |
| Iſland Blanco | 12 | 20 | 62 | 16 |
| Margarita | 11 | 28 | 62 | 01 |
| Tortuga | 11 | 30 | 63 | 04 |
| I. d'Orchita | 12 | 19 | 63 | 25 |
| Iſland Aves | 12 | 29 | 64 | 46 |
| Boniaire | 12 | 32 | 65 | 18 |
| Querifa | 12 | 25 | 66 | 03 |
| Aruba | 12 | 45 | 66 | 46 |
| Eaſt-End *of* Hiſpaniola | 18 | 47 | 67 | 52 |
| Middle *of* Hiſpaniola | 18 | 50 | 70 | 22 |
| Weſt-End *of* Hiſpaniola | 18 | 25 | 73 | 50 |
| Eaſt-End *of* Jamaica | 18 | 00 | 75 | 30 |
| Port Royal | 18 | 15 | 76 | 45 |
| Weſt-End *of* Jamaica | 18 | 38 | 79 | 21 |
| *The* Eaſt-End *of* Cuba | 20 | 27 | 72 | 30 |
| *The* Middle *of* Cuba | 22 | 00 | 81 | 20 |
| *The* Weſt-End *of* Cuba | 22 | 30 | 84 | 30 |

*Iſlands in the* West Indies.

| *Names of Iſlands.* | Latitude. North Latitude. D. | M. | Longitude. West Longitude. D. | M. |
|---|---|---|---|---|
| Caimanis | 19 | 41 | 83 | 05 |
| Grand Caiman | 19 | 21 | 80 | 30 |
| Stantavilla | 17 | 28 | 83 | 14 |
| Moſquito | 14 | 50 | 81 | 28 |
| Guanabo | 16 | 33 | 86 | 43 |
| Guanabimo | 16 | 10 | 88 | 28 |
| Cozumal | 19 | 25 | 90 | 20 |
| Laſalleiranas | 22 | 00 | 93 | 22 |
| Iſland Delas | 23 | 30 | 97 | 22 |
| Abraio | 25 | 50 | 99 | 24 |
| Labarmaia | 22 | 55 | 98 | 40 |
| Iſland d'Arenas | 22 | 36 | 98 | 38 |
| Zarka | 20 | 50 | 98 | 24 |
| Iſland *of* Providence | 13 | 27 | 80 | 00 |
| *St.* Andrea | 12 | 42 | 86 | 21 |

# OF THE atitude and Longitude OF PLACES.

*Atitude* and *Longitude* are two primary Affecti-
ons of the Earth: By the help of these two
th the *Geographer* strive to represent the Parts of
Earth, that they may keep symetry and har-
ny with the whole

*Latitude* is an Arch of the Meridian, comprehend-
between the Equinoctial and a Parallel. But *Lon-
de* is an Arch of the Equinoctial, intercepted by
Meridian of *London*, and the Meridian of any o-
r place.

or the exact settling of Latitudes, we have ma-
bsolute helps; but the Longitude of a Meridian,
at which hath, and still wearieth the greatest
ters of Geography.

have endeavoured to settle the Longitude with
uch exactness as possibly I could: for I not only
ulated according to the Latitude and Meridian-
ance of each Place from the Meridian of *London*;
h Meridian Distance I obtained from the exact-
*Geographical Charts* extant; but I consulted with
Reckonings of skilful and able Mariners; and

when

when I found any difference, I compoſed it both cording to Art and Reaſon.

As for inſtance; I had from skilful and able riners, upon their long experience, the Meri Diſtance from *Barbadoes* to the *Lizard*: Acco to which I have ſettled the Longitude of all the nent Places in the *Weſt-Indies*.

And for the ſettling of the Longitudes of the ces in *Eaſt-India*, I conſulted Obſervations of E ſes both Antient and Modern, as in 161 Page *Harmonicon Celeſte*, the Difference of Meridians tween *Goa* and *London*, is 5 h. 48 m. and *Malic London* is 7 h. 19 m. My Table hath the form theſe 6 h. 6 m. and the latter 7 h. 23 m. the D rence between my Table and the former of t Obſervations is 18 m. and of the latter is which Difference may be born withal.

*Note* 1. I do begin the *Longitude* at the Meri of *London*, and increaſing it on both ſides the Meridian; that is to ſay, both *Eaſtward* and *W ward*, and terminate at 180 deg.

2. Therefore (according to this account) all ces on the Eaſt ſide of the Meridian of *London*, li *Eaſt Longitude*: and on the contrary, all on Weſt ſide of it, lie in *Weſt Longitude*.

3. If a Ship be in *Eaſt Longitude*, ſailing to *Eaſtward*, the *Longitude* increaſeth; but ſailing the *Weſtward*, the *Longitude* decreaſeth.

4. And on the contrary, If a Ship be in *Weſt L gitude*, then ſailing to the *Weſtward*, the *Longi* increaſeth, and ſailing to the *Eaſtward*, it dec ſeth.

5. T

5. Take notice that to Places in *East Longitude*, he Sun cometh on their Meridian before it cometh n the Meridian of *London*. As if a Place lie in 15 Degrees *East Longitude*, the Sun cometh one Hour ooner to the Meridian there, than he doth to the eridian of *London*: If in 30 d. *East Longitude*, then wo Hours sooner, if 45 d. three Hours sooner, if d. four Hours sooner, if 75 d. five Hours sooner, 90 d. six Hours sooner, if 105 d. seven Hours ooner; and so you may reckon for any other Longi-de.

But on the contrary, All those Places that lie in *est Longitude*, the Sun or Star cometh on their eridi er he is past the Meridian of *London*.

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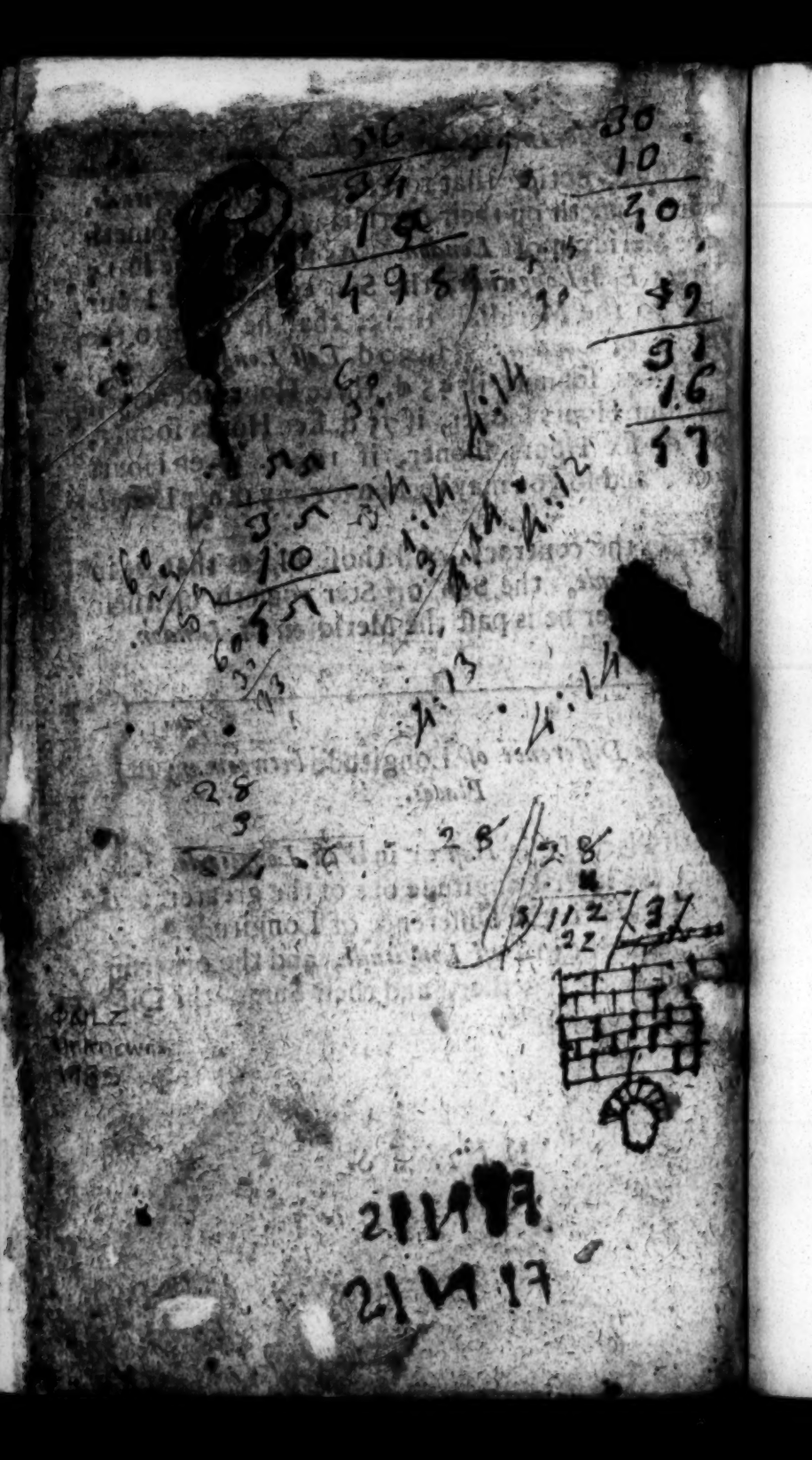
*nd the Difference of* Longitude *between any two Places.*

f both Places be in *East* or in *West Longitude*, sub-tract the lesser Longitude out of the greater, and Remainder is the Difference of Longitude.

f one Place be in *East Longitude*, and the other in add both together, and their Sum is the Dif-nce of Longitude.

*FINIS.*